

A. R. E. CONVENTION PROCEEDINGS NUMBER

March 13, 1941

Railway Age

MAR 18 1941

Santa Fe

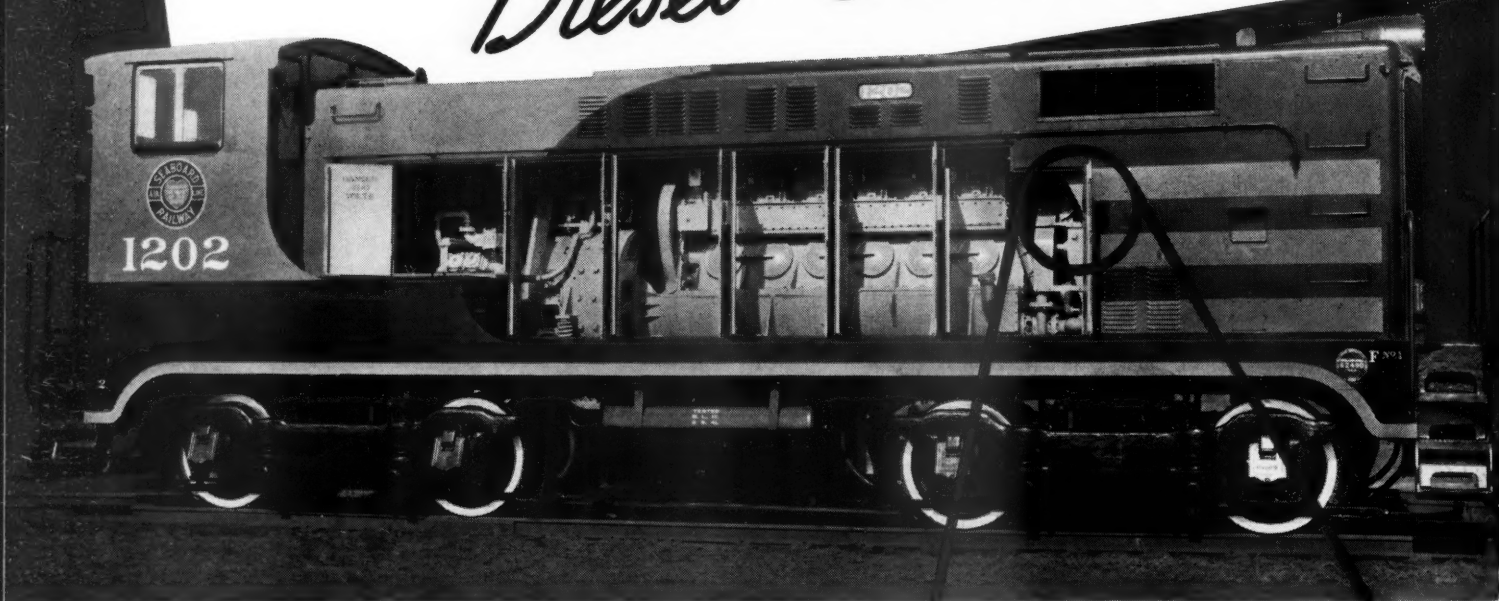
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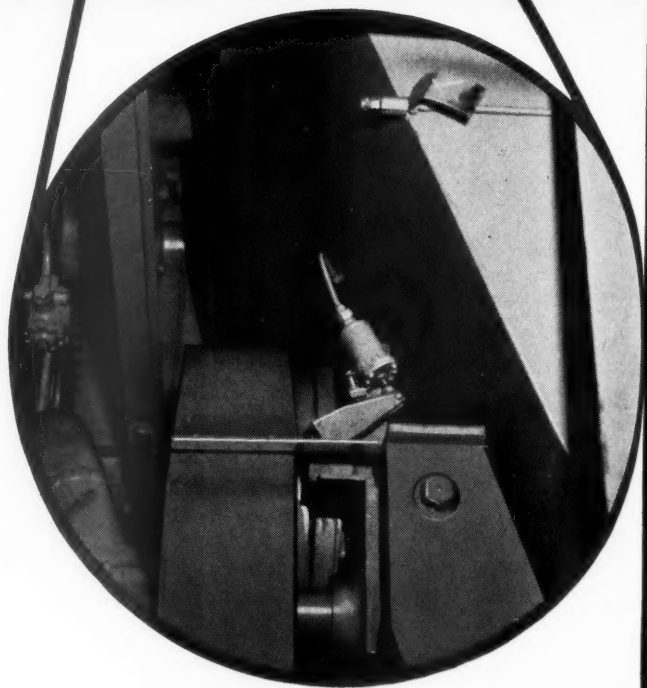


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THE BALDWIN LOCOMOTIVE WORKS

Philadelphia

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U. S. Patent Office.

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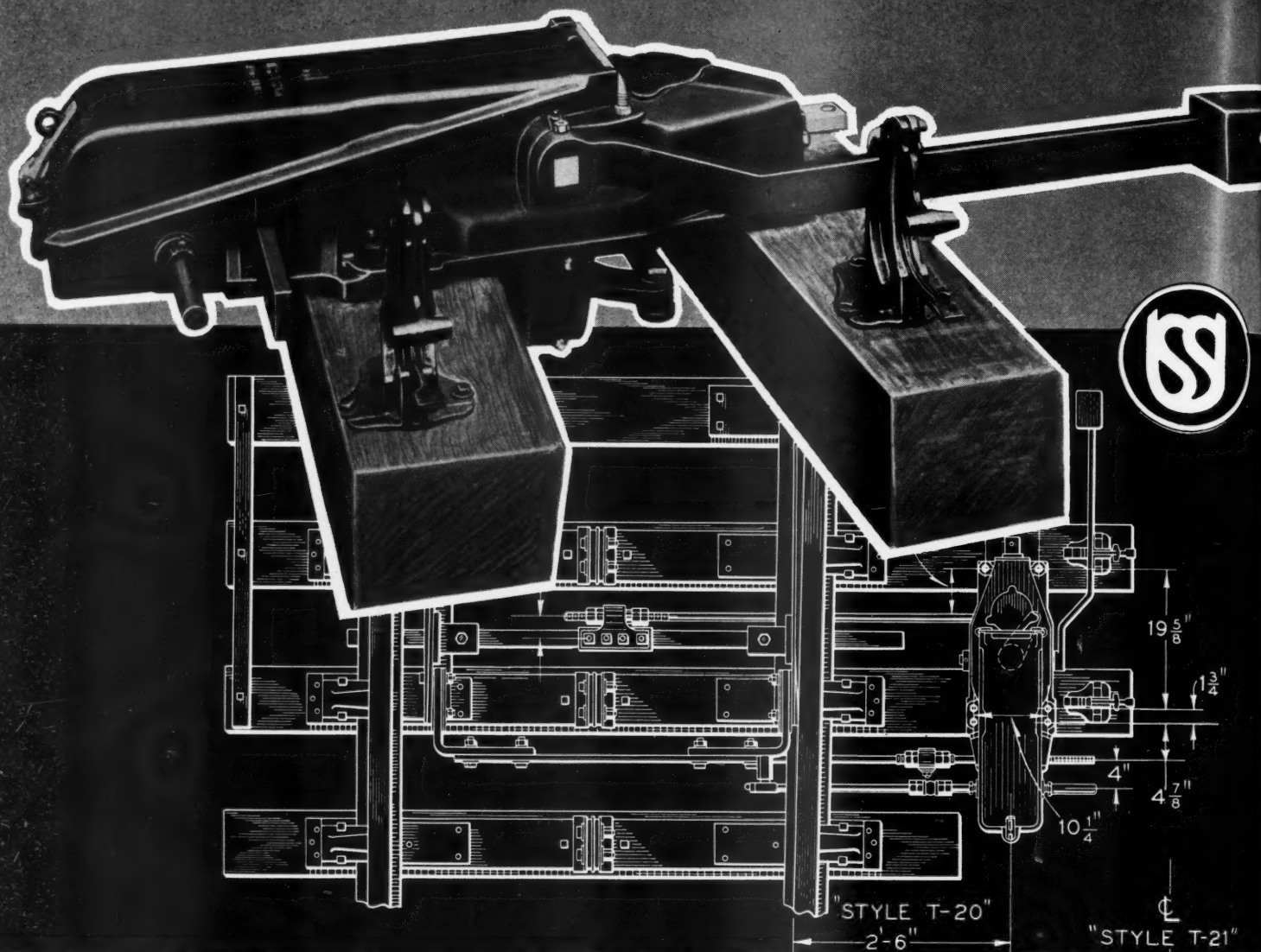
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The Railway Age is indexed by the Industrial Arts Index and also by the
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Simplicity of Construction, Installation and Operation

IS BUT ONE FEATURE OF THE

"UNION" T-20 and T-21 HAND-OPERATED SWITCH STANDS

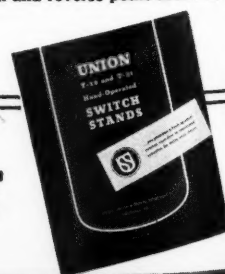
THESE switch stands are so designed that a minimum of parts is utilized. For installation, ties need only be $10\frac{1}{2}$ feet long. Special ties are unnecessary as the stands are designed for mounting on unframed ties of standard spacing. Maintenance is eased by the exposure of all working parts with the removal of a single cover. The several assemblies available in no way affect the common parts, all individual parts being interchangeable in all assemblies. Therefore, the number of spare parts is reduced to a minimum. Right and left hand stands have the same parts, the only difference being in the arrangement. Conversion from right to left hand, or vice versa, can be quickly accomplished.

These stands give interlocking protection at hand-thrown switches. If you have not received a copy of our Bulletin No. 156, describing these stands... we will be glad to mail you one upon request.

"UNION" HAND-OPERATED SWITCH STANDS

HAVE ALL THESE FEATURES:

1. Universal in application. For single switches, cross-overs, derails, etc.
2. Insure safety because of double locking feature.
3. Strong and durable, with long life.
4. Easy to operate because of anti-friction design of switch-throwing mechanism.
5. Simple in construction, installation and operation.
6. Parts interchangeable in all assemblies.
7. Protected against elements and dragging equipment.
8. Circuit controller, with single set of four contacts, and normal, reverse, or normal and reverse point detector, optional.



UNION SWITCH & SIGNAL COMPANY
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The Week at a Glance

FREIGHT DIESEL TEST: The test run, Argentine to Los Angeles, of the Santa Fe's first Diesel-electric freight locomotive, is described in detail in an illustrated article herein. Particularly noticeable in the test was the performance of the dynamic retarding brake—wheel heating was at a minimum and, on a 3 per cent descending grade, train brakes were used only about one-fourth as much as usual. Between Argentine and Los Angeles the Diesel took on fuel only four times—as compared to 28 water stops (12 also for fuel) for steam locomotives.

TRANSPORT BOARD "DITCHED"?: The transportation board, called for in the legislation President Roosevelt signed last September, is supposed to make its first report on May 1—and, at this writing, it has not even been named. The leading editorial herein suggests the possibility that the delay may lie in the fear lest such a non-partisan board might interest itself in the St. Lawrence Seaway (as, seemingly, the law requires). And, if the members of such a board were honest and competent men, quite likely they could not do otherwise than condemn this political venture.

RUTLAND PAY CUT: Organized employees of the Rutland have agreed to a 5 per cent pay reduction, and also that back pay withheld from them under a previous unauthorized reduction will not need to be made up by the railroad if such payment would reduce its working capital below the danger line. The employees also proposed the pulling off of a couple of switch engines—which, on the face of general practice, seems to be more precedent-shattering than the acceptance of a pay reduction. Further details of the settlement, effected under the good offices of an "emergency board," are given in the news pages herein.

ARMY RAILROADS: The Army has gone into the railroad business—entirely within the confines of military posts. For shifting operations, the War Department announces that it has ordered 60 locomotives—all internal combustion. A couple of these engines weigh 100 tons, but the bulk of them (45 in all) are said to be of the "mosquito" type (20 tons).

"UMBRELLA" RATES OK: The Supreme Court has approved the I. C. C. decision in I. & S. No. 4614, the Pacific Northwest Petroleum Case. In this decision the commission required the railroads to maintain rates at a considerably higher level than the carriers desired—the effect of the higher rates being to permit truck and barge competitors of the railroads to stay in business.

OIL MONOPOLISTS: Pipe lines, owned by the big oil companies, are a device which aids them to compete unequally with "independents"—such is the report of a Justice Department attorney to the TNEC. By charging pipe line rates which yield about 33 per cent on the investment, it appears that the large oil com-

panies are able to sustain low earnings or even losses in their marketing operations and still show substantial over-all profits. By contrast, the "independents," having no fancy pipe line earnings to bolster them up, have to compete with only meager marketing profits to keep them in business. If all this is true, it looks like a "commodities clause" is long overdue for the pipe lines—and, incidentally, for barge and water lines too. What some big business people find hard to comprehend is that taking undue profits out of monopolistic situations isn't any more compatible with free enterprise principles than are certain New Deal practices which they so heartily execrate. To condemn the latter and not the former is inconsistent, if done in ignorance, and hypocritical as well, if done with knowledge of the facts.

COURT OKAYS "MAKE WORK": A three-judge federal court has decided that the I. C. C. has power to insert job protection provisions into abandonment authorizations. As an editorial herein points out, such a provision is just another category of "make work" burdens, already piled high on the railroads. Such "make work" provisions do not make jobs—they just force the railroads to shove useful employees off the payroll to make places for useless ones. Nobody wants to see an employee lose out—but since funds for wages (and hence jobs) are limited, isn't it just as humanitarian to protect the jobs of needed employees as unneeded ones? The unions and the commissions and the courts seem to think not. The wheel that squeaks the loudest gets the grease, as the saying goes. But putting more and more men on the payroll who don't give value received in return doesn't seem a very smart way to keep the railroads in shape to meet their competition, and hence to maintain their employing power.

EDUCATION ON NCSTL: The Nashville, Chattanooga & St. Louis has inaugurated a comprehensive program of correspondence and class room education. Available to all employees, under the direction of a full-time staff officer, the purpose is not only to familiarize employees more fully with the function and operation of the railroad, but to encourage them to constructive thought and expression on railroad problems.

ARMY COST ESTIMATES: A skeptical friend calls our attention to the fact that "unforeseen factors" caused army cantonnements to cost 948 million dollars, when the original estimate was 609 millions—a slight error of 56 per cent. "Aren't the army experts who did the estimating on these jobs the same fellows who have given Mr. Roosevelt his modest figures on the cost of the St. Lawrence Seaway?"—our friend inquires. Our answer is that we don't know, but our guess is that the estimators are not the same individuals—judging from previous experience, a miscalculation of only 56 per cent is too near the mark to be attributed to the boys who predict waterway costs.

RATE PROBE CONTINUED: The states of New York and Michigan have had a turn-down from the I. C. C. in their request that the general class rate investigations (Nos. 28300, 28310, and MC-C-150) be suspended. Also denied was New York's plea that, if the probe was not postponed, it be "narrowed to the smallest possible limits."

WARNS ON SCRAP PRICE: Commissioner of Price Stabilization Leon Henderson has issued a warning on scrap prices. Present market prices are too high, he says, and maximum prices are soon to be fixed, varying from point to point throughout the country; but all of them lower than \$20 a ton, Pittsburgh.

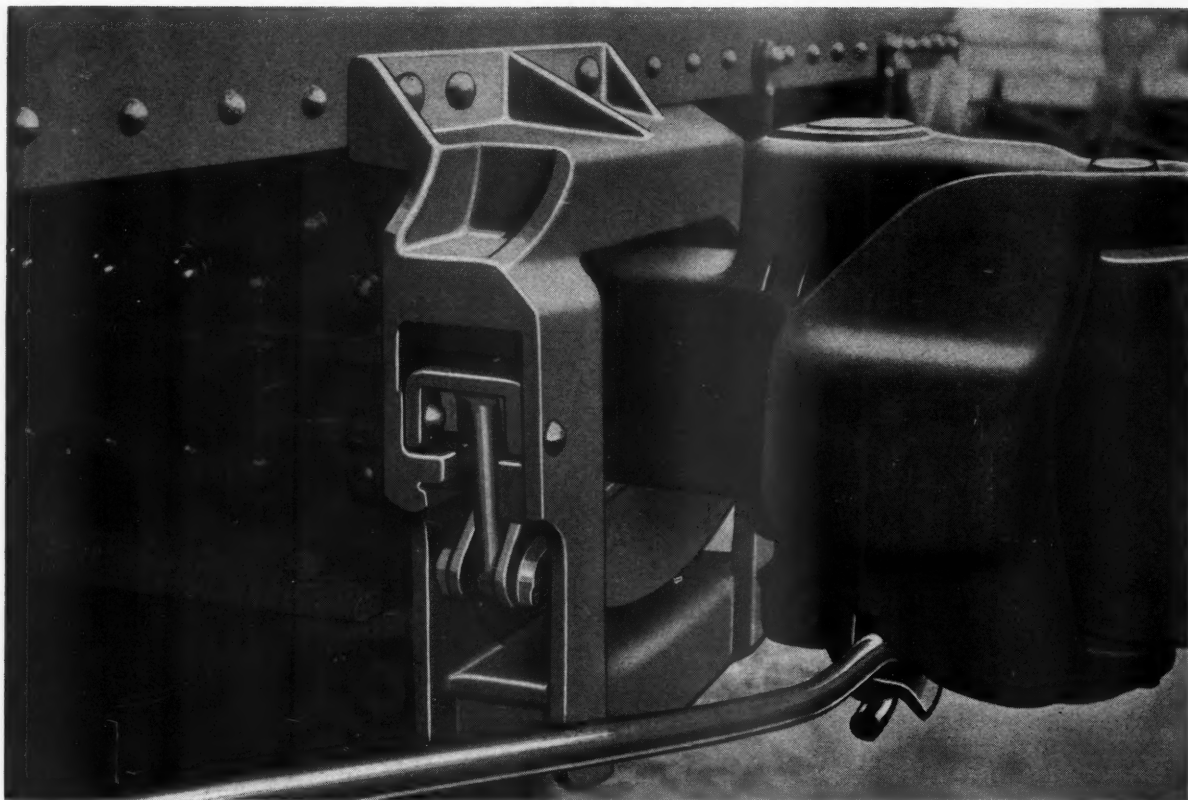
DESPOTISM NEAR?: Unchecked administrative agencies of government are one of the principal means of throwing away our democratic freedom under the law, and substituting despotism. Such is the conclusion reached by the eminent legal scholar, Dean Pound, in an article in the March issue of the American Bar Association Journal. Readers who have followed our editorials in recent months with any degree of interest will not want to miss this article. Knowledge of it is as important to genuine National Defense as the manufacture of munitions. The Dean taught many of the lawyers who are engaged in undermining our liberties and thus is well qualified to report what they are up to.

ENGINEERING MEETING: The large increase which is continuing in the railroads' activities under the jurisdiction of the engineering department make the subjects discussed at that department's annual convention, held this week in Chicago, unusually timely. A comprehensive report of the deliberations of this active professional organization appears elsewhere in these pages.

JANUARY ACCIDENTS: Railroad casualties in the first month of the new year made a rather favorable showing—considering the increase in traffic. Total fatalities were 375 as compared to 372 in January, 1940, the slight increase being more than accounted for by the larger number of trespassers who lost their lives. There were large reductions in both fatalities and injuries to passengers and employees, and train accidents totaled 675, as compared with 764 last year.

COMPETITIVE RATES: The successful executive is one who can be practical, and at the same time observe sound theoretical principles. Such is the suggestion in the "traffic box" on the editorial pages herein—which cites a letter from a prominent railroad traffic officer setting forth the principles of rate-making to which he subscribes. Basing competitive rates on comparative costs appears to have the endorsement of most practical traffic men while, theoretically, it is simply a concrete application of the eighth commandment.

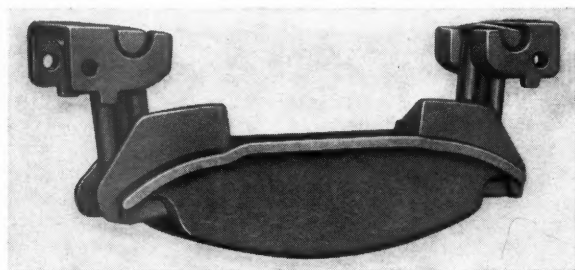
UNION SWING CARRY IRON CENTERING DEVICE



**PREVENTS WEAR ON
COUPLER SHANKS**

**REDUCES NUMBER OF
BROKEN COUPLER PARTS**

**SEPARATE TRUNNION
POCKETS ELIMINATE
WEAR FROM STRIKERS**



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STANDARD RAILWAY EQUIPMENT MFG. COMPANY

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Why the Delay in Naming The Transportation Board?

What can we say of the Administration in Washington, when it has a plainly-worded law calling for the establishment of an independent and non-partisan board to advise the country on transportation policy—but persistently neglects to name this non-partisan board, and, instead, delegates to an administrative department the performance of an important part of its functions? Of this act of usurpation-by-neglect, the Administration is plainly guilty. Let us look at the record. On September 18, 1940, President Roosevelt gave his approval to the Transportation Act of 1940. That Act contained a provision reading, in part, as follows:

"There is hereby established a board of investigation and research (hereinafter referred to as the 'Board') to be composed of three members who shall be appointed by the President, by and with the advice and consent of the Senate, for the period of the existence of the Board as hereinafter provided. Not more than two members of said Board shall be members of the same political party . . .

"It shall be the duty of the Board to investigate the relative economy and fitness of carriers by railroad, motor carriers, and water carriers for transportation service, or any particular classes or descriptions thereof, with the view of determining the service for which each type of carrier is especially fitted or unfitted; the methods by which each type can and should be developed so that there may be provided a national transportation system adequate to meet the needs of the commerce of the United States, of the Postal Service and of the national defense . . .

"On or before May 1, 1941, the Board shall transmit to the President and to the Congress preliminary reports of the studies and investigations carried on by it, together with such findings and recommendations as it is by that time prepared to make . . ."

Transport Board "Ditched"?

That law has been on the statute books for almost six months, and still the President has not named the Transportation Board. Why this neglect? A possible answer is to be found in the Administration's desire to impose the St. Lawrence waterway on the country—and its guilty knowledge that three men capable of constituting this Transportation Board would be hard to find who could give their approval to the St. Lawrence project. The language of the act, italicized in the above quotation, makes it clear that the Transportation Board, if appointed, could not lawfully refrain from studying and reporting on the St. Lawrence seaway.

In any event and for whatever reasons, President

Roosevelt has neglected the duty put upon him by the law to provide for the formulation of national transportation policy in a competent and non-partisan manner. Instead, he has asked the Department of Commerce—an administrative agency, and hence under Administration control—to "study" and report on the seaway scheme. This kind of servile "research" the department is obediently carrying out—the kind which reaches its conclusions first, thereafter seeking selected facts to support its "findings."

All Self-Supporting or All Socialized

Transportation cannot continue to exist in this country half slave and half free—or, to be more exact, supported in part solely by ordinary economic processes and with the remaining part politically aided, and hence largely independent of economic considerations. Either all commercial transportation will have to be made predominantly subject to ordinary economic processes, or that part which is now wholly politically unaided (i. e., the railroads) will have to seek, probably under government ownership, the same kind of tax-exemption and tax-aid enjoyed by its political rivals.

This is the transportation problem of this country. It cannot be avoided. It can only be postponed. It has already been postponed so long that even postponement will not be possible much longer. The Transportation Board, called for in the legislation which President Roosevelt signed last September 18, is the only step the national government has ever taken to view this national problem in a national manner. Except for this one provision of this one Act of Congress, the government's activity relative to transportation has been, and still is, wholly piecemeal and contradictory. The Public Roads Administration plans highways independently, without reference to the adequacy of other agencies of transportation. The Army Engineers proceed with their waterway projects just as if the locomotive and the automobile had never been invented. Colossal duplication and waste has been the inevitable result—and a stupendous and utterly unnecessary portion of the national income is being devoted to transportation, absorbing funds which might better be used to raise the standard of living of the "ill-clothed, ill-fed,

ill-housed" of which we hear so much; or for the necessities of the national defense, about which we ought to be hearing a lot more than we do.

Partisanship Get Attention; Public Interest Waits

The President is a busy man—of course. No one would expect him to have appointed the Transportation Board the day the Act was passed. But six months is a long time. During that period, the President has frequently had time to devote to conferences on the St. Lawrence seaway, which is a fraction of the whole transportation problem. He has had time to discuss with Roads Administrator Tom MacDonald the latter's grandiose scheme for toll-free "superhighways"—which again is only one piece of the jig-saw puzzle. But he has no law putting upon him the obligation to spend his time on these fractional transportation ventures—while he is obliged by the law to turn over the whole transport-planning job, including the parts of it to which he is devoting his valuable time, to a compe-

tent and non-partisan board which, once named, would no longer be his responsibility nor under his direction. There, quite likely, is the rub.

Meantime, time is passing. The Transportation Board is supposed, under the law, to make its first report on May 1, 1941. The statutory life of the Board extends only two years from September, 1940—and one-fourth of that time has already expired. We wonder what the railway employees who voted for President Roosevelt in such large numbers last fall think of his neglect of his duty to name this Transportation Board; thereby gravely endangering the future of their jobs. Quite likely, though, most employees have not had called to their attention this failure of the Administration to take this reasonable and morally-binding step, so necessary for their future protection. Whose duty is it to call this dereliction to their attention?

How can employees form opinions, make decisions and act in the protection of their own interests if they are not given the facts upon which such opinions, decisions and action may be intelligently based? What

Can "Theory" Be "Practical"?

We are endeavoring in this space—not to expound arm-chair theories of unattainable ideals in transportation pricing—but (if such is possible) to combine sound theory with full consideration of practical day-to-day conditions. This is a difficult objective. It is always easier to theorize if you don't have to check up on facts; and it is always easier to be "practical" if you don't have to worry about being sound or consistent. Anyhow, it is comforting to receive, from time to time, evidence that we have been tolerably successful in holding ourselves to the standard we try to maintain. For example, a letter has come from one of the leading railroad traffic executives, which includes the following observations:

"I fully agree with most, if not all, of the ideas you have expressed.

"In the long run, the use of different forms of transportation will find their level based on the economies of each without regard to artificial help or barriers from legislation.

"The railroads have lost more money in their attempts to meet truck competition by making rates too high than in making them too low. They lose money on traffic they continue to haul without recovering any from the trucks.

"Each form of transportation should handle the class of traffic it is best fitted to handle economically.

"One of our troubles has been that both the railroads and trucks have attempted to handle some proportion not only of each class but of each parcel of traffic."

This traffic executive believes also that the railroads should be allowed to move all "track to track" carload business for distances over 50 miles, because they can handle it much cheaper than the trucks. He points out that for regulatory authority arbitrarily to maintain rail rates high merely in order that trucks may compete at a profit is unsound; and that where one form of transportation can handle business at a profit, cheaper than others

can handle it, such a transportation agency should be allowed to take all of that particular traffic.

He believes that the railroads are making a mistake in not giving more consideration to the inroads that have been made by the trucks into carload business; and that the carload business lost by the railroads on a single commodity is often greater than their total l.c.l. traffic.

It is worth emphasizing that the man who expresses these opinions is no philosopher in an ivory tower, but one who has the practical responsibility of maintaining the traffic and revenue of a very large railroad. Time and time again, experience shows that, in the long run, the most successful executive is the man who *combines* both down-to-earth practicality with sound principles. The theorizer without the check of day-to-day experience soon loses touch with reality—while the man who is so "practical" that he ignores sound principles is likely to sacrifice the future unduly in behalf of the present.

For more than two years the central problem of proper pricing of competitive services has been set forth in this space and in all that time no one has even attempted to take issue with the fundamental approach to problem that has been suggested here. A succinct summary of this approach was given on page 342 in our February 22 issue wherein it was stated (in part):

"There is only one solution to the competitive transportation problem which is in accord with the spirit of free enterprise—and that is for each agency to be charged with all costs properly attributable to it; and then for each agency to apply rates which will divide traffic among them in accordance with whichever has the lowest costs for each particular job. Any other plan is dictatorial, monopolistic or paternalistic—and constitutes a denial of principles of the American system of economic freedom."

is the purpose of a labor union or a union press—to purvey and defend the doctrine of a particular political party, or to protect the interests of union members *wherever and by whomever* they are menaced? Are jobs and wages lost by New Deal political neglect somehow less painful to the victims than such visitations from other sources? What realism is there in execrating the latter and ignoring the former?

The Pac. Electric Decision

A three-judge federal court has decided the Pacific Electric abandonment case substantially in the manner urged by the railway union litigants—namely that the Interstate Commerce Commission has power to insert provisions in abandonment authorizations for the protection of jobs of employees who might otherwise become unemployed as the result of such abandonment. The court, however, has not found that the commission is required to provide protection for such employees—its power is discretionary.

Whether this case will be appealed or not, we do not know at this writing. To the lay mind the decision—like the Rock Island merger decision on which it is based—has all the earmarks of “legislation by the judiciary.” The court comes along and imputes to the commission powers which Congress has had plenty of opportunity to give to it, but did not; and which the Commission itself did not think it possessed. Back in the days before the courts became predominantly New Deal in character, this kind of decision was frowned upon by “liberals.” In those days they preferred a court which let Congress do about what it wanted—not one which tried to make law out of precedents to meet entirely new situations.

But neither the courts, nor Congress, nor the I. C. C. can repeal economic law. Economic law appears to *fix the total wages paid to railway labor, on the average, at about 47 per cent of total railway revenues*. That being so, if the I. C. C. comes along in an abandonment case and says that jobs have got to be found for Engineer Jones and Conductor Smith and Section Foreman John Doe, of a branch line—that just means that some other employees somewhere else will have to be fired in order to get the money to pay the wages of these protected employees. Total railway employment and total railway wage payments (as the figures show) are not aided by compulsory “make work” payments.

Where the railroad industry—and, eventually, railroad employees also—suffer from this kind of thing is that *employees who perform no useful service get the money, instead of an equivalent sum of money being paid to employees who would do useful work for their wages*. Since the railroads (and also their employees) are up against dangerous competition, they ought to be using every available wage dollar for the employment of men who would add something to the economy or convenience of railroad service—and thereby strengthen

the carriers' competitive position. It is improbable that doing away with all “make work” rulings would cut so much as a nickel off of total railroad employment or total wages paid to employees. On the contrary, the absence of “make work” expenditures—while not denying anything to employees as a whole—would help put a stop to the railroads' dwindling traffic and employing power by enabling them to spend their wage money for improving their competitive position.

The piling up of artificial “make work” obligations on the carriers is the surest way there is, not only of expropriating their owners, but also of destroying the railroads' future employing power. But the useful employees, who have to be laid off so the carrier can pay wages to unnecessary employees, never know that this is the reason why they are furloughed; while, on the other hand, the beneficiaries of the “make work” practices are constantly reminded of the loyalty they owe to the champions of these rulings. Since justice nowadays seems to tend more and more to be determined by a show of hands, it follows that sound practices today depend as never before upon a popular understanding of economic questions. How many railroad employees are informed on these matters, to the extent necessary to make intelligent decisions for their own long-run welfare? Whose duty is it to provide them with such information?

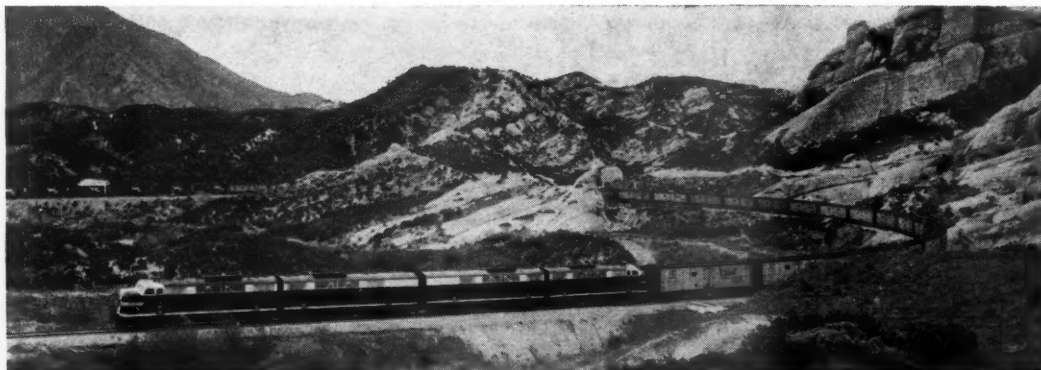
Payrolls Increase \$10,000 per hour

The payroll of the Class I railways in December totaled approximately 167 million dollars. This was the highest December payroll for any year in the last decade, or since 1930; it was more than 7 million dollars larger than the wage bill for December, 1939. This *increase* alone cost the railways an average of \$240,638 per day *more* in December, 1940, than in December, 1939, or, to refine the matter still further, the railroad payroll was *increased* an average of more than \$10,000 per hour.

Total wages paid by the railroads for the month of December amounted to 152 million dollars in 1931, and to 118 million dollars in 1932 and in 1933. Successive increases then brought the total to 123 million dollars in 1934, to 140 million dollars in 1935, and to 162 million dollars in 1936. The payroll for the month of December then fell to 157 million in 1937 and again to 150 million in 1938. The trend was then reversed and the total payroll for December rose to 160 million dollars in 1939 and to 167 million dollars in 1940, this latter total being the largest figure for any December in the last ten years.

These December wage payments brought the payrolls of the Class I railroads in 1940 to \$1,964,000,000, an increase of more than \$100,000,000 over the corresponding total for 1939.

Santa Fe Tests Main-Line Diesel Freight Power



In Cajon Pass, Calif.

Electro-Motive 5,400 hp. locomotive demonstrates adaptability for high-speed freight service in first regular run to the Pacific Coast

THE Atchison, Topeka & Santa Fe installed its first Diesel freight locomotive, No. 100, in regular main-line service and completed a test run from Kansas City (Argentine) Kan., to Los Angeles, Cal., as described briefly in the *Railway Age* issues of February 8 and 15. This 5,400-hp. locomotive, designed and built by the Electro-Motive Corporation, General Motors subsidiary, La Grange, Ill., was also tested with a dynamometer car on the eastbound run and is now temporarily assigned to regular freight service between Shopton, Ia., and Wellington, Kan. In general, the test results with this locomotive have been highly satis-

factory and the Santa Fe has placed orders for three more locomotives of the same size and type from the same builder, two of them recently and one several months ago.

In addition to a varying number of freight cars, the test train included, at the head end, Diesel locomotive No. 100, a dynamometer car and five business cars to accommodate officers of the railroad and the locomotive builder, as well as about 20 observers who were invited to witness the tests. The train left Argentine, February 5 and arrived at Los Angeles February 8, in a total elapsed time of slightly over 72½ hr., as shown in the table which gives the general test results. No particular attempt was made for a speed record either by means of unusually high operating speeds or reduced delays on the road and at terminals. As a matter of fact, the running time for this trip of 1,761.8 miles was 54 hr. 35½ min., which gives an average running speed of 32.3 m. p. h.



Top View of the Diesel Freight Locomotive Taken During the Test Run

Santa Fe 5,400-Hp. Diesel Freight Locomotive Performance on First Revenue Run from Argentine, Kan. to Los Angeles, Cal.

Total distance, miles	1,761.8
Running time, hrs.	54.59
Dead time on road, hrs.	6.15
Total time on road, hrs.	60.74
Dead time at terminals, hrs.	11.83
Total elapsed time, hrs.	72.57
Total number of stops	54
Minimum number of cars	49
Maximum number of cars	68
Minimum number of tons	2,262
Maximum number of tons	3,150
Thousands of gross ton-miles	5,171
Average running speed, m.p.h.	32.3
Average speed, total time on road, m.p.h.	29.0
Average speed, total elapsed time, m.p.h.	24.3
Minimum speed on grade, m.p.h.	15.0
Maximum speed on run, m.p.h.	68.0
Million ft. lb. at drawbar	198,858
Total fuel oil consumption, gal.	10,830
Unit fuel consumption, gallons:	
Per mile	6.15
Per thousand gross ton-miles	2.09
Per million ft. lb.	0.0542

The locomotive demonstrated ample reserve capacity to handle heavier trains than the one used in the test and at substantially higher speeds. For example, the test train, with a maximum of 68 cars and 3,150 tons, was handled successfully over all ascending grades up to 1.6 per cent westbound on the Santa Fe southern and western districts, without a helper and at a speed generally of about 30 m. p. h. The maximum speed attained during the run was 68 m. p. h. between Amarillo,



Diesel Engine and Motor Controls—Traction-Motor Transition Indicator

Tex., and Clovis, N. M., this portion of the road being predominantly a 0.6 per cent ascending grade.

Similarly, on descending grades, the locomotive gave an excellent account of itself due to the dynamic braking feature, which was thus employed for the first time in connection with Diesel motive power. Dynamic braking was used at four places during the run for a total of 83 miles; namely, from Mountainair, N. M., to Belen, 17.5 miles; Supai, Ariz., to Ash Fork, 20.0 miles; Louise, Ariz., to Yucca, 23.0 miles; and Summit, Cal., to San Bernardino, 22.5 miles. Maximum grades on these four mountains ranged from 1.27 to 3 per cent. At a speed of 20 m. p. h., the retarding effect exerted behind the locomotive was 48,000 lb., and the horsepower 2,560. At 29 m. p. h., the corresponding figures were 35,200 lb., and the horsepower 2,730.

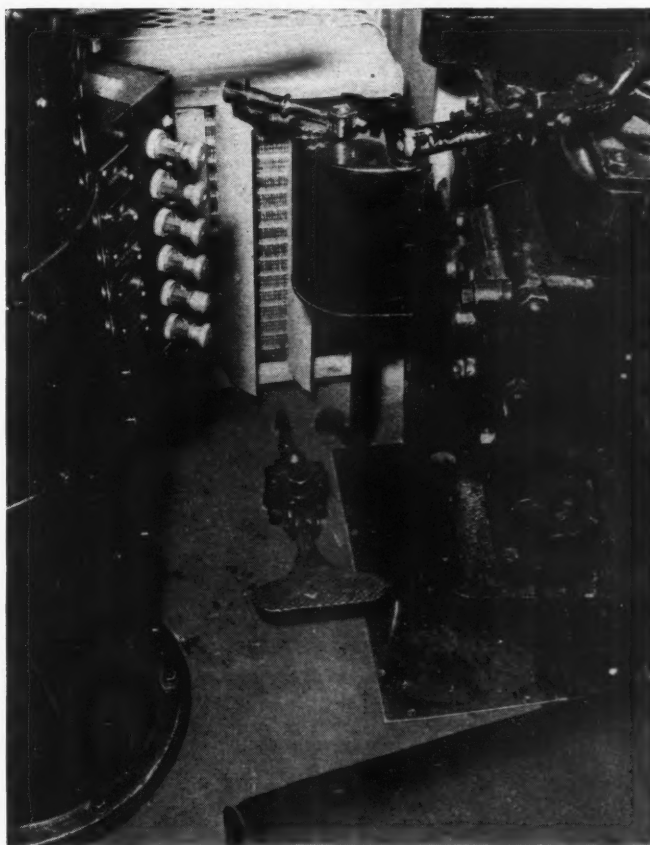
In negotiating the 3 per cent descending grade westward from Summit, the train length was limited to 50 cars in accordance with customary Santa Fe practice and the retaining valves were set up as an added safety measure. Where the dynamic retarding brake was used, it was necessary to set the train air brake only about one-fourth as much as usual. There was no evidence of excessive wheel heating throughout the run and when stops were made after descending heavy grades, the

wheels never much exceeded bare hand temperature. The total energy absorbed by the dynamic brake during its use on this run is estimated at 19,700 million foot pounds, or approximately 10 per cent of the entire energy that was used to move the train throughout this test run.

The next most significant thing about this Diesel freight locomotive test run was the fact that a total of seven steam locomotives would ordinarily have been required to take the same train from Argentine to Los Angeles, with not less than 28 stops for water, on 12 of which fuel would also have been taken. The Diesel locomotive made the entire trip with only four stops for fuel and the addition of a little engine cooling water; namely, at Wellington, Kan., Clovis, N. M., Winslow, Ariz., and San Bernardino, Cal. The locomotive was serviced at Los Angeles and could have started the return trip, if necessary, with practically no delay.

Tonnage trains may be handled by this Diesel locomotive with fuel stops spaced 500 miles apart. The distance between the Santa Fe refueling stations, mentioned above, averaged 440 miles. Due to the installation of adequate fuel-pumping facilities and individual hose lines to the locomotive sections, the actual refueling time on the test run was shown to be 7 min., which may be compared with 35 min. formerly required when refueling from tank cars and other more or less temporary facilities. Reference to the table summarizing test results indicates that on this particular run the locomotive consumed an average of 6.15 gal. of fuel per mile. In hauling the test train 1,761.8 miles, the unit fuel consumption of the locomotive was 2.09 gal. per 1,000 gross ton-miles and 0.0542 gal. per million ft. lb. of work done at the drawbar.

During the test run, and subsequently, this Diesel locomotive showed notable reliability of performance and high availability for service. After being thoroughly



Dynamic Brake Control and Dead-Man Pedal on the Cab Floor

Principal Dimensions of Santa Fe 5,400-Hp. Diesel Locomotive

Overall length, ft.	193
Width over body posts, ft.-in.	9-10
Height above rail, ft.-in.	14-1½
Distance between truck centers, ft.-in.	27-3
Truck wheel base, ft.	9
Number of pairs of driving wheels	16
Wheel diameter, in.	40
Sand capacity, cu. ft.	80
Fuel capacity, gal.	4,800
Weight on drivers (fully loaded), lb.	923,600
Starting tractive force	220,000
Factor of adhesion	4.2

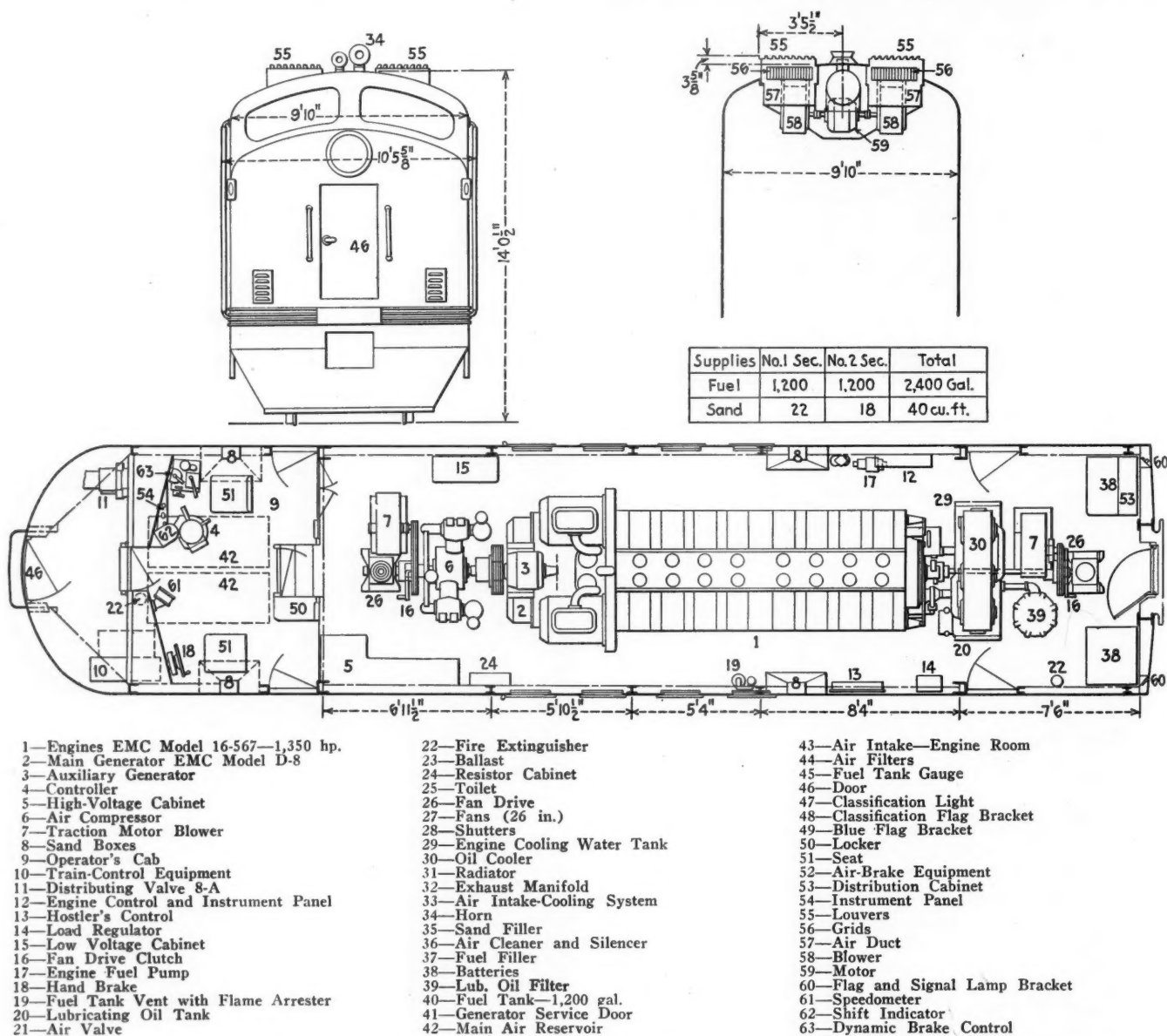
broken in, the locomotive made the test run without any special mechanical attention except the replacement of one cracked cylinder liner and the cleaning of two oil filters. The train parted once due to the breaking of a defective coupler and, on another occasion, when the brakes were set from the rear end, to avoid leaving a flagman, the locomotive developed its full rated drawbar pull of 220,000 lb., as shown by the dynamometer, before the power could be shut off. Fortunately, the couplers held in this instance and the train did not part.

In both starting and rate of acceleration, the locomotive demonstrated highly desirable characteristics. With full engine power available from rest, the locomotive easily started tonnage trains and accelerated them to desired operating speeds in much less time than for-

merly required. Apparently the only necessary precaution, as indicated by the test run, is to increase the power output of the Diesel engines and the corresponding drawbar pull slowly enough so that unnecessary shocks and excessive stresses will not be introduced into the freight-car couplers and draft connections. With uniform starting tractive force, all weight on drivers and a conservative factor of adhesion, there is no wheel slippage with this locomotive except possibly under unusually adverse wheel and rail conditions.

Locomotive No. 100 Can Really Move Cars

Besides being the first Diesel locomotive in regular main-line freight service and the first equipped with electric retarding brakes, the Santa Fe 5,400-hp. Diesel Locomotive, No. 100, is said to have greater tonnage-moving capacity than any steam locomotive ever placed on the rails, and the truth of this claim is apparently indicated by the accompanying table which compares it with the largest and most powerful steam locomotives previously built. Its starting tractive force of 220,000 lb., for example, substantially exceeds that developed by its nearest competitor, the Virginian 2-10-10-2 compound locomotive, built in 1918, even when the latter was



Floor Plan, End Elevation, and Cross-section of the No. 1 Section of the Santa Fe 5,400-Hp. Diesel-Electric Freight Locomotive

operated for short intervals with single steam expansion. As compared with the Northern Pacific 2-8-8-4 single-expansion steam locomotive, built in 1929, the starting tractive force of the Diesel is 66,700 lb. greater, the total engine weight about 100 tons less and the length 68 ft. more.

In another table and on the drawing are given the principal dimensions and general arrangement of equipment in locomotive No. 100. The locomotive, with a rated top speed of 80 m. p. h., is designed so that it may be operated from control stations in the streamline nose of either end, thus eliminating the necessity of turning. The locomotive consists of four sections, hinged at three points to facilitate proper weight distribution, permit the locomotive to negotiate curves with ease, avoid high rail stresses and increase wheel life. This design also permits free movement of crew members through the locomotive with unusually easy access for all service or repair operations.

The design is further distinguished by a short truck rigid wheel base with all of its advantages. Each section has two four-wheel trucks and power is thus applied at 32 wheel points. The Edgewater heat-treated rolled-steel wheels are 40 in. in diameter. The trucks are designed to negotiate 23-deg. curves, or a 250-ft. radius,

with $2\frac{1}{4}$ in. free lateral motion in the truck bolster and $\frac{3}{8}$ in. in the journal boxes.

General Construction of the Locomotive Sections

The locomotive body framing, made of welded carbon-molybdenum steel, simulates bridge construction and is designed for high strength per unit of weight. Side paneling applied to the frame members are not included in stress calculations. At the cab end, collision framing above the platform consists of a combination of posts, plates and braces. Two large front posts are securely fastened to the platform and a deep anti-telescoping plate, the ends of which tie into heavy diagonal braces, are anchored in the side framing. The elevated cab floor

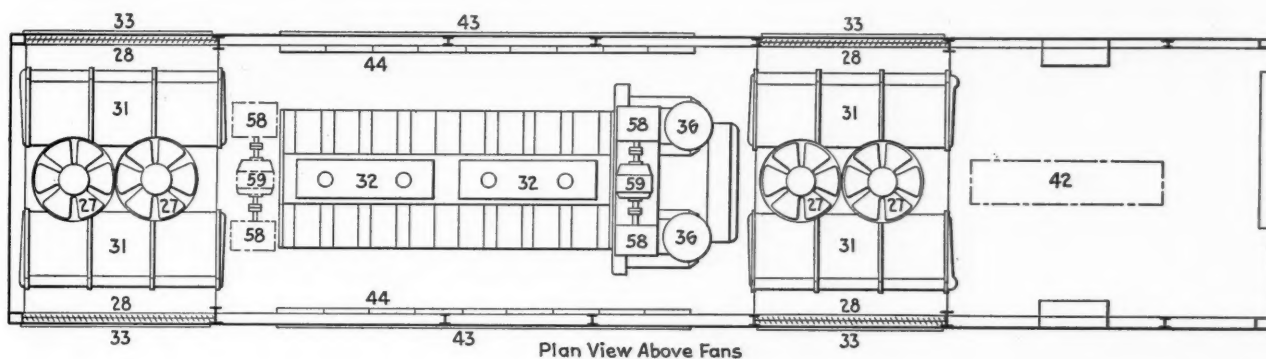
Santa Fe 5400-Hp. Diesel Freight Locomotive Compared With Largest Steam Power Previously Built

	Length, ft.	Weight, lb.	Starting tractive force, lb.
5400-hp. Diesel locomotive (1940).....	193	923,600	220,000
N. P. 2-8-8-4 simple steam (1929).....	125	1,116,000	153,300*
Virginian 2-10-10-2 compound (1918).....	97	898,300	176,600†
Erie 2-8-8-8-2 triplex (1914).....	90	853,000	160,000‡

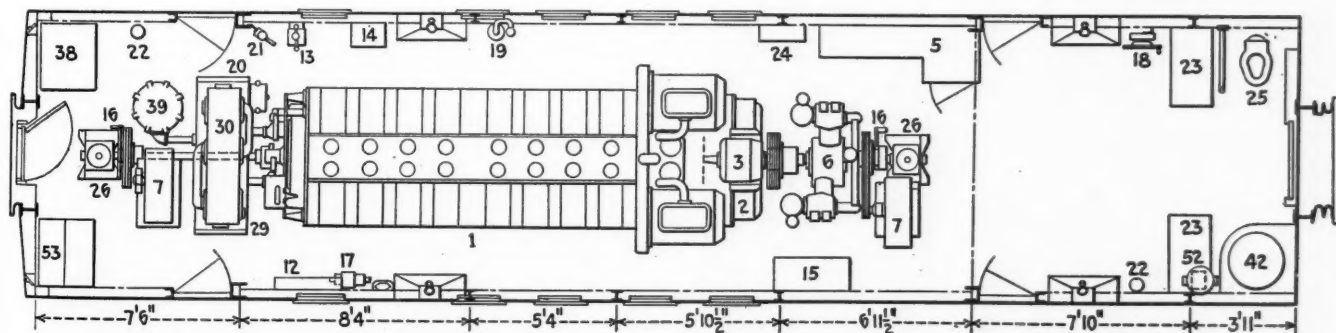
* Includes 13,400 lb. for booster.

† Working simple; 147,200 lb., compound.

‡ Maximum tractive force, working compound.



Plan View Above Fans

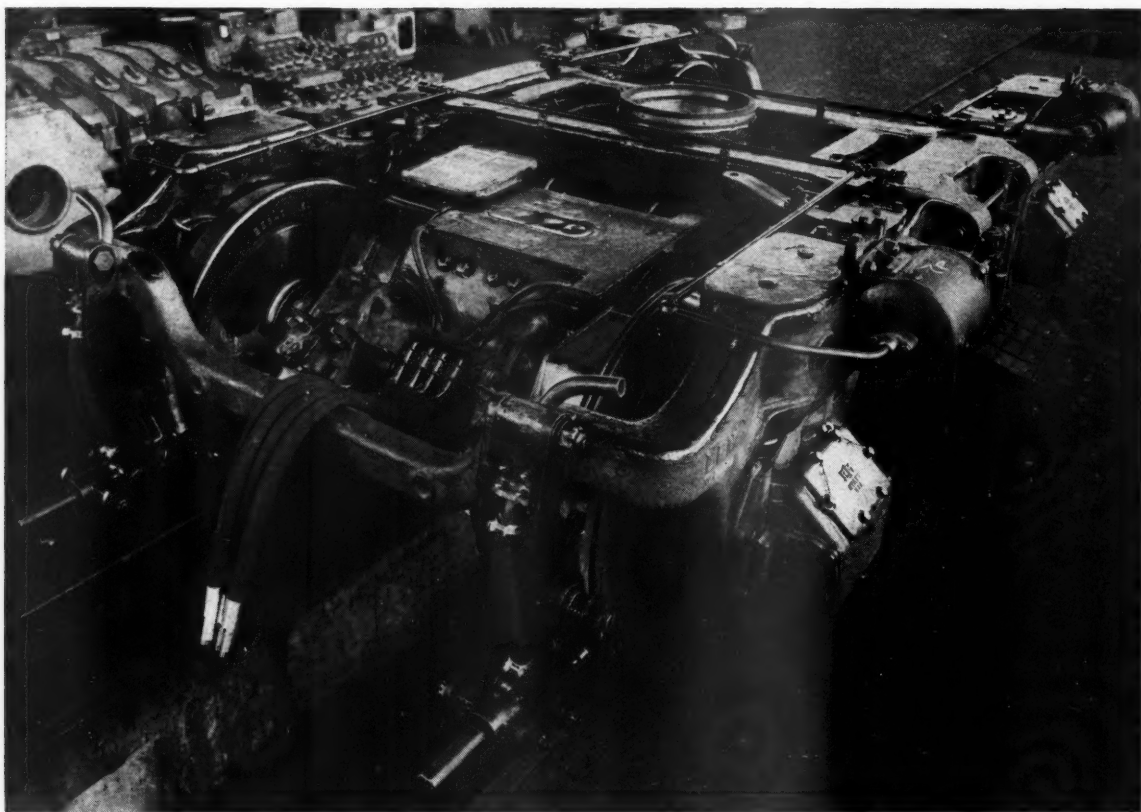


- 1—Engines EMC Model 16-567—1,350 hp.
- 2—Main Generator EMC Model D-8
- 3—Auxiliary Generator
- 4—Controller
- 5—High-Voltage Cabinet
- 6—Air Compressor
- 7—Traction Motor Blower
- 8—Sand Boxes
- 9—Operator's Cab
- 10—Train-Control Equipment
- 11—Distributing Valve 8-A
- 12—Engine Control and Instrument Panel
- 13—Hostler's Control
- 14—Load Regulator
- 15—Low Voltage Cabinet
- 16—Fan Drive Clutch
- 17—Engine Fuel Pump
- 18—Hand Brake
- 19—Fuel Tank Vent with Flame Arrester
- 20—Lubricating Oil Tank
- 21—Air Valve

- 22—Fire Extinguisher
- 23—Ballast
- 24—Resistor Cabinet
- 25—Toilet
- 26—Fan Drive
- 27—Fans (26 in.)
- 28—Shutters
- 29—Engine Cooling Water Tank
- 30—Oil Cooler
- 31—Radiator
- 32—Exhaust Manifold
- 33—Air Intake-Cooling System
- 34—Horn
- 35—Sand Filler
- 36—Air Cleaner and Silencer
- 37—Fuel Filler
- 38—Batteries
- 39—Lub. Oil Filter
- 40—Fuel Tank—1,200 gal.
- 41—Generator Service Door
- 42—Main Air Reservoir

- 43—Air Intake—Engine Room
- 44—Air Filters
- 45—Fuel Tank Gauge
- 46—Door
- 47—Classification Light
- 48—Classification Flag Bracket
- 49—Blue Flag Bracket
- 50—Locker
- 51—Seat
- 52—Air-Brake Equipment
- 53—Distribution Cabinet
- 54—Instrument Panel
- 55—Louvers
- 56—Grids
- 57—Air Duct
- 58—Blower
- 59—Motor
- 60—Flag and Signal Lamp Bracket
- 61—Speedometer
- 62—Shift Indicator
- 63—Dynamic Brake Control

Floor Plan and Plan View Above the Fans of the No. 2 Section of the Santa Fe Diesel-Electric Freight Locomotive



One of the Four-Wheel Power Trucks Ready for Application Under the Locomotive

supports, front bulkhead and the rear partition members are all arranged to give added strength to the front end structure. Roof hatches are installed for easy installa-

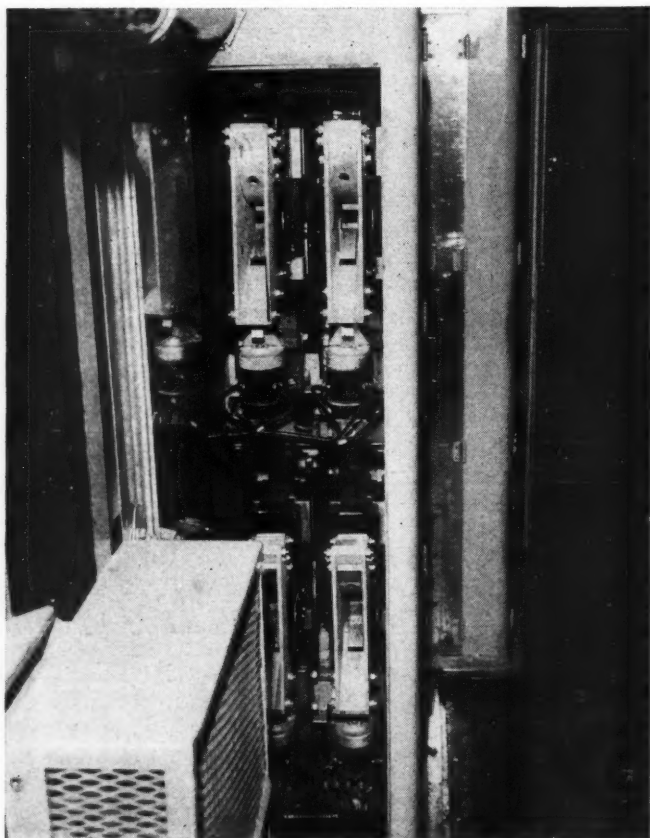
tion and removal of engines, generators and other equipment.

The outside finish consists of panels of $\frac{3}{8}$ -in. plywood, completely covered with suitable gage Galvannealed steel with soldered edges to protect against moisture. This material is used because of its light weight and flat surface. Bolt holes not being permitted, these panels are clamped in position by the use of battens. Space between panels for batten bolts and to permit uneven expansion of materials is filled with a plastic asphalt putty. The streamline front end is covered with 12-gage steel which is welded to the framing and assists as a stress member.

The underframe construction is supplemented by a welded $\frac{1}{2}$ -in. floor plate which acts as a foundation for anti-skid runways. Body center plates are Grade-B steel castings, welded to the body-bolster assembly. Wear plates are applied to the bottom and outside surfaces.

The locomotive control cab is located approximately over the front bolster. The cab floor is elevated above the locomotive platform to give maximum vision. The cab is accessible through a door on each side and from the engine compartment by means of a three-step stairway. The sloping V-shape front windows are equipped with automatic windshield wipers, defroster and sun visors. Drop sash side-windows are included. Swivel, adjustable, upholstered seats, with back and arm rests are installed at both the engineman's and the fireman's position. Cabs are soundproofed against both engine-room and track noises. Safety plate glass is used in all windows and doors. The front windshield glass is $\frac{1}{16}$ in. thick and all other $\frac{1}{4}$ in.

Front and rear couplers are A. A. R. Type-E with special heavy shanks. The locomotive sections are permanently connected with metallic-hose connections. National Malleable Type M-380 rubber draft gears are used at the front and rear. The drawbar carrier is



Dynamic Brake Contractors—Upper Contractors for Power, Lower Contractors for Braking

spring-supported. The coupler connection is designed for a swing of 17 deg. and has an 11-in. knuckle. The removable pilot is made of $\frac{3}{16}$ -in. steel plate, substantially braced both laterally and longitudinally. A 7-in. rolled-section anticlimber is applied to the front end of the platform.

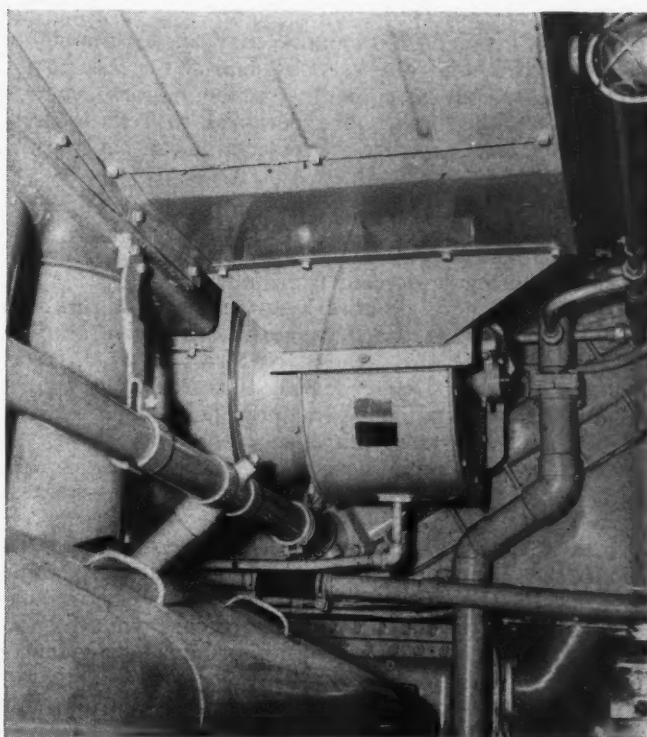
The four-wheel truck assemblies are interchangeable. Greater stability and improved riding qualities in negotiating curves are obtained by the same method of load suspension as on Electro-Motive six-wheel trucks for passenger locomotives. The alloy cast steel truck frames, made by the Locomotive Finished Materials Company, are supported on each of the four journal boxes by twin-group coil springs. The swing bolster is supported at each end by quadruple full-elliptic springs. These springs rest on each end of the spring plank which in turn is carried by spring hangers pivoted from the outside of the truck frame. Each of the two traction motors in each truck is supported by the driving axle to which it is geared and a spring motor nose suspension on the truck transom. Truck assemblies are equipped with EMC design clasp brakes actuated by four brake cylinders per truck.

Four hydraulic shock absorbers are mounted between the truck frame and bolster to eliminate excessive lateral oscillation and to ease the body against the truck frames when entering or leaving curves.

The $6\frac{1}{2}$ -in. journals are equipped with Hyatt roller bearings of special EMC design, whereby the lateral thrust is removed from the journal bearing itself and taken through a cushioning arrangement directly on the box. Journal-box pedestal guides are equipped with spring-steel wear plates.

The truck center plate is designed with wear plates, dust guard and lubricating arrangement. Although the truck center plate is so large that there is no need for side bearings, the usual friction-type side bearings are included; also a special EMC-design truck and body interlock which serves to prevent the truck from sluing in case of derailment.

The brake-lever ratio is 5.66 to 1. Two 18-in. brake



Motor-Driven Blower for Cooling the Grids in the Dynamic Brake Circuit

shoes per wheel give an average shoe pressure of 12,250 lb. in an emergency application. Based on an average loaded weight of 836,000 lb. for the locomotive, the braking ratio is 70 per cent with 50 lb. brake cylinder pressure, or 95 per cent with 68 lb. cylinder pressure. During operation of the electric retarding brake, the power generated by reversed traction motors, is fed back into air-cooled stainless-steel grids located in the roof where heat will be easily carried off.

The brakes are designed to exert a retarding force of



One of the General Motors 1,350-Hp., 16-Cylinder, 2-Cycle Diesel Engines—Seen from the Blower End

80,000 lb. at 22 m. p. h., with a lesser step at which the retarding force is 54,000 lb. at 33 m. p. h. At the higher step the grids dissipate 4,690 hp. and at the lesser step, 4,753 hp. In either case the traction motors generate 540 amp. The brakes are designed to retard safely downgrade any load that the locomotive can haul up the same grade.

Power Plant Equipment

Motive power is derived from four 1,350-hp., 2-cycle, 16-cylinder General Motors Diesel engines, one in each locomotive section. Each engine is direct connected to an EMC 600-volt d. c. generator and a two-stage, three-cylinder Gardner-Denver air compressor. A supplemental 10-kw. auxiliary generator, adjustable between 74 and 78 volts, is mounted above and driven by vee belts from each main generator. The generators are used as motors for engine starting. Each generator feeds four EMC Type D-7b d. c. roller-bearing motors, two in each truck assembly, directly geared to the driving axles. Motors are cooled by clean air delivered from blowers in the body immediately above the motors through ducts in the floor which connect with flexible rubber ducts held against the motor-housing air intake ports.

High-voltage control consists of manual transition forward and backward, with four motor connections, series-parallel, series-parallel-shunt, parallel and parallel-shunt. Switch equipment for transmission of single generator output to four traction motors is suitably arranged in ventilated cabinets. All high-voltage circuits are safeguarded by a ground protective relay. Two Exide 32-cell storage batteries are located, one in each first section.

The cooling system for the engines consists of two 200-gal. per min. engine-driven water pumps and forced air circulation through Harrison fin-tube radiators located in the ceiling of the engine rooms. Each engine has a separate water supply tank with cooling-system capacity of 225 gal. Provision is made for steam jet preheating of cooling water from an external source after a layover period, if desired. Engine temperature control is accomplished by forced air circulation through seamless-tube type radiator assemblies. Four vertical 34-in. fans, driven from the engines through clutches, deliver approximately 80,000 cu. ft. per min. of air per engine. The engine air delivery is completely controlled by means of the fan clutches and by the manually operated shutters mounted in the air intake ducts, located along the top of the locomotive sides.

A dual circulating lubricating-oil system is installed for each engine. This comprises a single-pressure pump for oil delivery from the supply tank to the engine lubricating system, a separate pressure pump for oil delivery from the supply tank to the piston cooling system and a scavenger pump for oil delivery from the engine sump through a four-element filter and three Harrison oil coolers into the supply tank. The capacity for the system is 190 gal. A motor-driven dual pump per engine drives the return-flow fuel system. The fuel tank capacity is 1,200 gal. per section, or 4,800 gal. for the locomotive.

Westinghouse No. 8 EL brake equipment is installed, with KS-8-PB brake valve, safety control features and maximum-speed governor control. The brake pipe consists of copper tubing with extra-heavy brass fittings. Main reservoirs, only, are made of USS Cor-Ten steel with riveted seam and welded heads and have a capacity of 25,000 cu. in. each.

The electro-pneumatic trunk-line control system comprises: (A) An engineman's control station containing throttle with engine-speed control mechanism, motor

connection lever, reversing lever with actuating means for control of traction motor reversing position which lever when removed from the station voids all locomotive movements; (b) four-valve, eight-position, electro-pneumatic engine-governor operating mechanism, mounted on the engine; (c) power-plant control push-button box with fused switches for master control circuit, generator field, fuel pump and push button for engineman's helper call signal and defroster blower switch; (d) locomotive light switch box with five push button controls; (e) instrument panel, indirectly lighted, containing air-brake gages, speedometer and wheel-slip indicator; and (f) main-generator load meter to indicate proper motor connection.

A local control station is installed in each engine room and includes start and stop buttons, isolation switch, master air valve to electro-pneumatic governor control, alarm system to show low oil condition, tachometer, lubricating-oil and fuel pressure gages, hot-engine indicator and fuel-pump contactor. The signal alarm system shows by gongs and colored lights low lubricating-oil pressure, hot engine water, wheel slip and hot journal.

Warning signals include soft and loud air-operated horns and one EMC 12-in. locomotive bell with internal ringer. Hot water, led from the engine-cooling system into two units with a fan-driven air circulating system is used to heat the cab control stations.

The Duco color scheme of the locomotive is Santa Fe dark blue with a wide yellow band separated from the blue by narrow vermilion stripes. A bronze Santa Fe medallion adorns each front end.

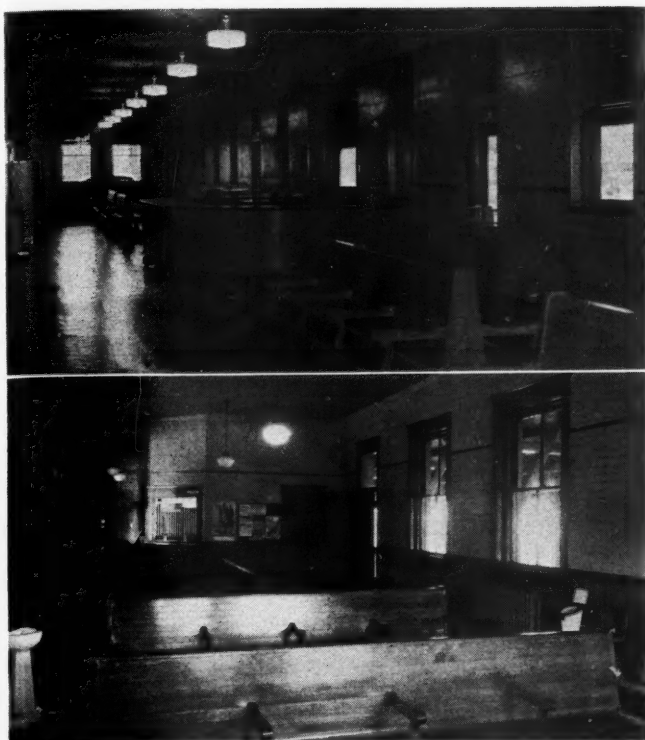
Station at Rochester Has Its "Face Lifted"

IN order that its Rochester, Minn., station might reflect the prestige of its deluxe passenger trains, the Chicago & North Western has transformed this 50-year-old station into an up-to-date office that is quite unlike outlying passenger facilities. This rejuvenation was accomplished by the application of modern materials and furnishings, notably an open counter, and a rearrangement of equipment; by sand blasting and washing the exterior rough-faced stone and brick walls and by replacing out-moded doors and windows with modern plate glass doors and more attractive frames and glass.

The old interior beaded wood walls were covered with a semi-polished wall board, light green board being applied to the lower four feet of the walls and light buff from this point to a line level with the tops of the windows. The two colors were separated by a four-inch band of black and all vertical and horizontal joints were covered with aluminum strips. The beaded wood ceiling was covered with pink painted wood fiber board that was scored into 18-in. squares, this board being carried down the walls to the height of the windows to overcome the feeling of height, caused by a 14-ft. ceiling. Walls and ceilings of the two toilet rooms were treated similarly.

The old enclosed ticket office, which divided the station into two parts, was replaced by a light green metal counter 24-ft. long. This counter provides space for file drawers, folder racks, drawers, compartments, a safe and a telegrapher's table.

Other modernizing features include chromium plated indirect lighting fixtures, streamlined steel lockers and a telephone booth for the convenience of patrons, and metal-covered radiators. In addition, all sanitary fix-



The Spaciousness of the Transformed Station Above Contrasts with the Crowded Condition of the Old Interior Below

tures in both toilet rooms were replaced with modern equipment, with toilets with low-down tanks, floor-type urinals, and lavatories. A small table, a draw-up chair and a mirror were installed in the women's room to give one corner a "powder room" effect.

I. C. C. Approves R. F. C. Plan for M. & St. L.

WASHINGTON, D. C.

COMPLETELY reversing its decision of a year ago, the Interstate Commerce Commission on March 10 made public a report granting to the reorganization managers of the Minneapolis & St. Louis authority to effect a plan of reorganization for that road which will divide it into two parts to be owned by two newly-organized companies. Although the majority of eight members take the position that the amended plan filed after the denial of last year makes material changes in the old plan, Commissioner Patterson dissented, saying that the new plan was essentially no different than the one frowned upon by nine members of the commission last year, while two members, Commissioners Aitchison and Rogers took no part in the decision.

It is difficult to reconcile the majority's reasoning in this favorable decision as contrasted with that in its denial of a year ago, a summary of which was given in the *Railway Age* of April 20, 1940, page 711. The details of the two plans are not essentially different except that the former plan contemplated the purchase of the properties with a \$5,000,000 Reconstruction Finance Corporation loan while in the latter plan there would be a \$4,000,000 R. F. C. loan. It is clear that the commission now feels that accepting the R. F. C.'s conditions calling for two companies is the only feasible way of reorganizing the old corporation.

Details of the second plan to rehabilitate the road,

which is roughly the same as the third plan except for some changes in the financial structure, were given in the *Railway Age* for May 20, 1939, page 882. The plan, as approved by the commission, contemplates that the 1,520-mile road which has been in receivership since July, 1923, will be split into two new separate operating companies linked by stock ownership. The purchase of the properties by the two new companies will be financed by a \$4,000,000 loan from the R. F. C. guaranteed by 25-year first mortgage bonds bearing interest at the rate of four per cent.

Under the plan, the new company, to be known as the Minneapolis & St. Louis Railway Company, will operate some 900.1 miles while the new corporation, known as the Minneapolis & St. Louis Railroad Corporation, will operate some 529 miles.

To carry out the proposed transaction the company is authorized to issue \$4,000,000 of first mortgage, four per cent bonds; \$2,081,500 of second mortgage income bonds series A; 150,000 shares of common capital stock without par value; while the corporation is permitted to issue 10,000 shares of common capital stock without par value.

Capitalization of New Companies

Under the plan the capitalization of the new company will be 150,000 shares of common stock without par value; \$4,000,000 of first mortgage bonds, or collateral loans secured by such bonds; \$2,081,500 of second mortgage income bonds and \$1,030,900, principal and interest, of equipment trust obligations. The capitalization of the new corporation will be 10,000 shares of capital stock without par value, which will be pledged under the new company's first mortgage. The fixed charges for the new company are estimated from 1941 to 1945, respectively, as \$213,000, \$203,200, \$194,400, \$186,600, and \$182,800. The fixed charges for the new corporation for the year 1941 are estimated at \$1,200 which represents the approximate aggregate annual payments for interest on deferred payments covering assessments for public improvements.

At the same time Division 4 authorized the R. F. C. to loan the new company \$4,000,000, to be repaid in 25 years, and the proceeds to be used for the following purposes:

1. Improvement program as described in the application (estimated cost)	\$1,978,000
2. Payment of 40 per cent of the residue of principal of preferred claims	699,400
3. Payment of 80 per cent of the principal of the Merriam Junction-Albert Lea mortgage	760,000
4. Organization expenses (estimated)	100,000
5. Amount necessary for bidding at the foreclosure sale (estimated)	100,000
6. Contingencies	362,600
Total	\$4,000,000

I. C. C. Would Prefer One Company

After observing that the termination of a long-standing receivership of railroad properties is always a matter of substantial public interest against which must be weighed the disadvantages, if any, of the particular plan in mind, the majority go on to say that "It probably would be preferable were we asked to approve a plan providing for ownership by a single company and unified operation thereof, but no such plan is before us, and it does not appear that any other plan could be presented within a reasonable time in the future."

"The property," continues the majority, "could be

reorganized under the Bankruptcy Act, but this would result in further delay and perhaps in the end no better plan would be evolved. With the exception of a minority of the preferred claimants previously referred to, the plan appears to be generally acceptable to those financially interested, and it is to be assumed that the rights of creditors will be protected adequately by the court which has jurisdiction over the receivership. There is no indication that money necessary to satisfy to some extent the preferred claims and the Merriam Junction-Albert Lea mortgage can be obtained from any source other than the Finance Corporation.

Law Has Been Changed, Says I. C. C.

"We no longer are required to group carriers in conformity with a fixed consolidation plan, as was the case when our previous decision was rendered herein. The substantive finding which we are required to make under the present law is that the transaction will be consistent with the public interest. The additional safeguards now thrown around the new corporation tend to place it in a comparatively strong position. With the elimination of the portion of the property asserted to be the most unprofitable, the operation of the remainder should be successful or at least as successful as it would be if it were conducted by the new company as owner. The new corporation will have considerable mileage, including among its gateways the import city of Minneapolis, and its parent company will afford it a strong traffic connection. It will begin its existence with a substantial working capital and with no debt of any kind. If railroad property of such scope cannot be operated under such favorable circumstances, it probably could not be continued long as part of a weak line struggling to end a receivership.

"... Inasmuch as the Finance Corporation refuses to make the loan unless the property is separately owned and operated and since funds for reorganization cannot be obtained elsewhere, the question seems to be whether the road should be taken out of receivership or not. As the weight of opinion seems to be in favor of taking it out of receivership, the further question is whether it should be done as suggested in this plan or by proceedings under section 77 of the Bankruptcy Act. For the reasons heretofore given, we believe that the authorizations necessary to consummate the proposed plan should be granted."

* * * *

Included in the majority's findings are certain conditions which are attached to the grant of power, among which are the following:

1. That the company and the corporation shall establish and maintain joint rates on all traffic moving between stations on the line of the former on the one hand, and stations on the line of the latter on the other, or moving over either or both lines in conjunction with other railroads, which are on the same basis as the rates now maintained by the M. & St. L., and shall maintain and keep open all routes and channels of trade through gateways now existing, unless and until otherwise authorized by the commission.

2. That the operating agreement between the company and the corporation shall be amended so as to provide that it shall not under any circumstances, including the failure of the new corporation to pay the new company charges accruing thereunder, be cancelled, altered, amended, or otherwise changed without the consent of the commission.

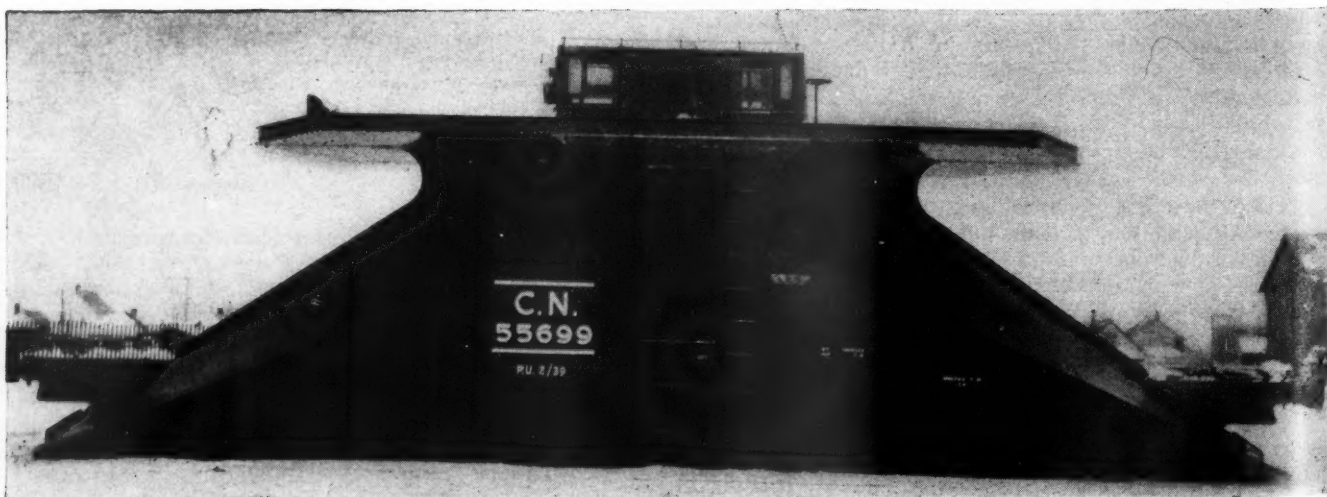
The commission further reserves jurisdiction to make additional findings and impose such terms and conditions as may be required by the labor-protection provisions of section 5 (2) (f) of the Interstate Commerce Act with respect to employees involved if upon petition it is made to appear that the condition of their employment has been or will be adversely affected by anything done pursuant to authority granted under section 5 (2) of the act within the four-year period immediately subsequent to the effective date of the order.

Patterson Quotes Previous Report

Among the quotations from the commission's decision of last year disapproving the plan which were quoted by Commissioner Patterson, was one appearing on page 87 of the opinion, to the following effect:

"We conclude that the record fails to establish that the plan for division of the property involved into two separately operated corporate units is in the public interest. A contrary conclusion could be predicated only upon conjecture and surmise and would amount to an abdication of the responsibility imposed upon us by the law."

"The above," concluded Commissioner Patterson, "is equally true with respect to the plan now before us. It likewise should be disapproved."



This Two-Faced Snow Plow Is One of a Number Operated By the Canadian National in its Atlantic Region, in Territory Where Wye Tracks Are Not of Sufficient Length to Permit Turning of a Plow and Engine



F. L. C. Bond
Acting President and President-Elect



H. R. Clarke
Senior Vice-President



W. S. Lacher
Secretary

Engineering Officers Prepare to Meet Increasing Demands

Intensive program of A. R. E. A. convention in Chicago reflects enlarging responsibilities of construction and maintenance men and their determination to meet them

THE American Railway Engineering Association held its forty-second annual convention in Chicago on March 11, 12 and 13, bringing to culmination a year of intensive work on the part of committees and individual members. More than for many years in the past, it was a meeting staged in an atmosphere of increasing enthusiasm and confidence, born of the prospects of increased traffic and enlarged programs of construction and maintenance in the months ahead. However, this atmosphere was mingled with a strain of seriousness and concern arising out of the increased responsibilities which this situation will bring about, especially as the railways prepare to meet such demands as may arise out of the government's huge national defense program and improved business conditions generally.

As for a number of years, the convention was held in the Palmer House, with two general sessions on Tuesday, Wednesday and Thursday for the presentation and discussion of committee reports and the transaction of association business. Altogether, there were 1,218 in attendance, representing practically all of the railways of the United States and Canada. Twenty-six standing and special committees presented reports. These reports, covering more than 100 different subjects relating to tracks, bridges, buildings, water service, signals, work organizations and mechanical equipment, reflected the enlarged and changing problems of railway engineering and maintenance officers.

Special Features

Special features of the program were an address by C. H. Buford, vice-president, Operations and Main-

tenance department, Association of American Railroads, at the opening session on Tuesday, who spoke convincingly of the ability of the railways to meet the contemplated traffic demands of the National Defense program and improving business generally; and the Association luncheon on Wednesday, with more than 800 present, which was addressed by the Hon. Clarence F. Lea of California, chairman of the Committee on Interstate and Foreign Commerce of the National House of Representatives, who spoke on federal transportation legislation. Still another feature of the meeting was the attendance at the sessions on Tuesday of 35 engineering students from Notre Dame and the Universities of Illinois, Michigan, Minnesota and Wisconsin, upon the invitation of the Committee on Co-operation Relations with Universities; special tribute paid to Dr. A. N. Talbot, professor emeritus, University of Illinois, and for 27 years chairman of the Special Committee on Stresses in Railroad Track, in recognition of his service to the association and his retirement as chairman of that committee at the close of the convention; and a special period set aside in the opening session on Tuesday as a memorial to George S. Fanning, president of the Association, who died on January 2, and to other members long active in the work of the association who passed on during the year.

At that time, speaking for the officers and directors of the association, as well as for its members, E. M. Hastings, past-president of the association and chief engineer of the Richmond, Fredericksburg & Potomac, paid tribute to Mr. Fanning as a man, as an engineer, and as a valued and tireless worker in the interests of the association and its objectives. "Mr. Fanning," Mr. Hastings

said, "put himself unselfishly into all the walks of life wherein he trod, and the engineering profession, the railroad industry, civil and social life, are all better because he was here and contributed to the forward movement of all. To look at the record of such a life and personality should be a challenge to all of us as we face the future." Continuing, he said, "The last year has cut deeply into the ranks of those that this association has honored and who by their work have helped to make the association what it is. In addition to Mr. Fanning, there passed on during the year past-presidents William B. Storey, Lawrence A. Downs, John V. Neubert, and J. C. Irwin, Director Robert Faries and others.

All of the general sessions of the convention were presided over by Acting-President F. L. C. Bond, vice-president and general manager of the Central region of the Canadian National, assisted by vice-president, H. R. Clarke, engineer maintenance of way of the Chicago, Burlington & Quincy, and W. S. Lacher, secretary. The report of the secretary showed that receipts during the last year exceeded disbursements by \$1,815, and the membership as of March 1, 1941, totaled 1,882. The registration at the convention was 692 members and 526 guests, a total of 1,218, which compares with a registration of 719 members and 483 guests, a total of 1,202 last year, and 667 members and 362 guests, or a total of 1,029, in 1939.

New Officers

At the final session on Thursday the following officers were elected for the ensuing year: President, F. L. C. Bond, vice-president and general manager, Central region, Canadian National, Toronto, Ont.; vice-president to serve two years, W. F. Cummings, chief engineer, Boston & Maine, Boston, Mass.; directors, F. S. Schwinn, assistant chief engineer, M. P., Houston, Tex.; Elmer T. Howson, vice-president and western editor, *Railway Age*, Chicago; and B. R. Kulp, chief engineer, C. & N. W., Chicago; members of Nominating Committee: A. E. Perlman, engineer maintenance of way, D. & R. G. W., Denver, Colo.; C. H. R. Howe, cost engineer, C. & O., Richmond, Va.; J. A. Lahmer, senior assistant engineer, M. P., St. Louis, Mo.; A. D. Kennedy, assistant engineer A. T. & S. F., Chicago; and Olive W.

Dennis, engineer of service, B. & O., Baltimore, Md. In addition, H. R. Clarke, engineer maintenance of way, Chicago, Burlington & Quincy, Chicago, and vice-president of the association, was advanced automatically to senior vice-president succeeding Mr. Bond.

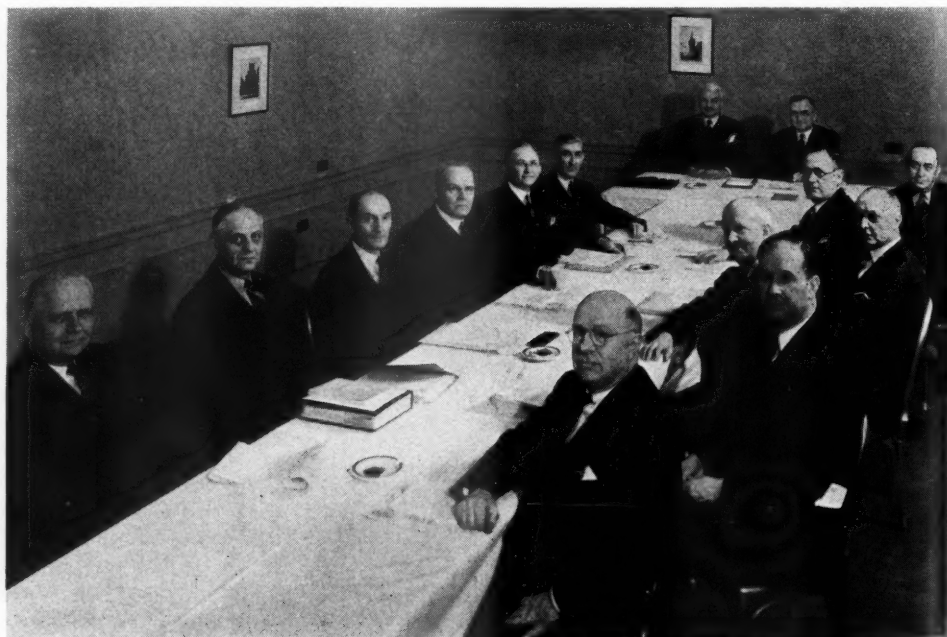
Coincident with the convention activities proper, the National Railway Appliances Association held its thirtieth annual exhibit of equipment and materials of special interest to railway engineering and maintenance officers at the International Amphitheatre, as reported elsewhere in this issue.

Acting-President Bond Reviews the Association Year

"It is with a heavy heart and a deep sense of the responsibility that develops upon me as the result of the calamity that has befallen our association through the loss of our president, George S. Fanning," said Acting-President F. L. C. Bond in an address opening the convention, in which he reported on the activities of Mr. Fanning during his term of office. He spoke especially of Mr. Fanning's efforts to attend meetings of the individual committees during the year; to make more interesting the presentation of committee reports; and to stimulate active and constructive discussion on the floor of the convention. Continuing, he spoke of the many accomplishments of the individual committees during the year, singling out for special mention the work of the Committee on Track, which was presenting 50 new track-work plans for consideration and adoption, and that of the recently created Committee on Co-operative Relations with Universities, which was making its first report to the association. Then, calling attention to the expanding activities of the association in the field of research, he spoke of the enlarged allotment to the association by the Association of American Railroads for carrying out research work, this amounting to \$25,900 more in 1941 than in 1940, and of the recently authorized investigation of the effect of counterbalance on track, which is being conducted jointly with the Mechanical division of the A. A. R.

Mr. Bond then announced the resignation of Dr. A. N.

The Board of Direction of the A. R. E. A. in Session Just Before the Convention—From Left to Right Around the Table—W. H. Penfield, F. R. Layng, A. A. Miller, Vice-President H. R. Clarke, J. B. Akers, Past-President E. M. Hastings, Acting-President F. L. C. Bond, Secretary W. S. Lacher, Past-President F. E. Morrow, J. G. Brennan, Past-President A. R. Wilson, C. E. Smith, Armstrong Chinn and G. P. Palmer



Talbot, professor emeritus of the University of Illinois, as chairman of the Special Committee on Stresses in Railroad Track, effective at the close of the convention, and told of the replacement of this special committee, effective as of the close of the convention, by a newly-created committee to be known as the Committee on Research Administration. In this latter regard, he spoke further of the enlarged scope of investigations being carried out by the association, and of the work of the research engineer who was engaged four years ago for the special purpose of taking an important part in the research activities of the Engineering division.

Functions of New Committee

The new committee, he said, will exercise the following three principal functions: (a) Exercise general supervision over such research work of the Engineering division as is administered by the research engineer, insofar as it relates to assignments of A. R. E. A. committees, of work that falls within the scope of the association's activities; (b) review the requests of the standing committees for research appropriations; service and submit them to the Board of Direction with appropriate recommendations; and (c) initiate arrangements with universities and others when the need for co-operative investigations is indicated.

In closing his address, Mr. Bond referred to the recent change in the constitution of the association, establishing a junior grade of membership; reported an encouraging reaction to the change made, and said, "we look forward to a continuing response from those younger members of our profession who are resolved to equip themselves for their chosen profession and who can appreciate the incalculable benefits and opportunities placed at their disposal through being identified with the association."

C. H. Buford Sees Rail Transportation Adequate to Needs

Speaking before the opening session on Tuesday, C. H. Buford, vice-president, Operations and Maintenance department of the Association of American Railroads, commended the association and its members individually in meeting their increasing problems and responsibilities, and then turned immediately to a discussion of the general railway situation, to show the railways prepared to meet any emergency demands that may be ahead. He deprecated the outspoken concern of those who cite the difficulties of the railways in meeting the war traffic demands in 1917 and 1918 and point a finger of doubt at their ability to handle the traffic that may develop from the present national defense program. Characterizing these spokesmen as misinformed, he dwelt at length upon the underlying causes of the transportation difficulties during the earlier emergency and upon the many measures that have been adopted by the railways, in conjunction with shippers and the federal government, to prevent any recurrence of these difficulties with the development of any volume of traffic that can be reasonably expected in the months ahead.

During the earlier war period, he said, there was no strong central railway organization with authority to meet the transportation emergency, and the difficulties that arose all added up to one thing—that railway cars were used for storage instead of for transportation purposes. Today, he pointed out, the railways have a strong

central organization in the A. A. R., with authority to act for them in emergency, working closely with the army, navy, and shippers; there is the Port Control office established by the A. A. R. to expedite export movements; there is the Car Service division, with its Military Transportation section looking after the specific transportation needs of the army and navy; and there are the 13 Shippers' Advisory boards throughout the country to look after the needs of shippers and to keep the railways apprised of these needs in advance.

In an attempt to correct any exaggerated conceptions of the transportation needs of the next two years, Mr. Buford presented estimates prepared by Ralph Budd, transportation commissioner of the Advisory Commission to the Council of National Defense, and by the Bureau of Railway Economics, which indicate total carloadings of 39,780,237 in 1941, an increase of 9.4 per cent over 1940, and total carloadings of 42,293,982 in 1942, an increase of 16.9 per cent over 1940.

"After a careful analysis," he said, "I am convinced that the main line, yard and terminal capacity of our railroads is more than adequate for any business that will develop as a result of the national defense program. The only increase that may be needed will be in equipment." Concerning the latter, he continued, "there are sufficient cars in sight now to take care of loadings this year, and others are being ordered as needs warrant. More cars will be purchased or rebuilt as earnings increase. The equipment purchases that are being reported to us indicate conclusively that the railroads were serious when they assured those whom they serve and the Government of the United States that they would meet to the full the demands of commerce and the needs of national defense."

In closing, Mr. Buford urged the co-operation of the members of the association in allaying fear and hysteria in connection with our national defense efforts, saying, "you are well fitted to think clearly in these strenuous times, and I hope you will lose no opportunity to correct any loose talk that you may hear about the railroads and their ability to cope with any transportation situation."

Hon. Clarence F. Lea* Speaks on Transportation Legislation

The test of economic regulation for the next 10 years depends upon how successfully it may preserve useful transportation, prevent its substitution by a less qualified service and so stabilize the industry that sources of funds for continuing operations and replenishment of capital shall not dry up. In other words, the desirable remedy is to put the carriers on a self-supporting, healthy basis. If this end shall be accomplished, the responsibility, to no small degree, must rest upon the Interstate Commerce Commission as our regulatory body. Its task will call for enlarged responsibilities, greater initiative and new approaches to some of their problems.

If it be true that we have excess transportation facilities that must be discarded, that some must perish and some survive, then the problem of regulation is to see that the conditions under which some survive and others perish must be under fair rules of competition,—in other words, under a system of rules which, as nearly as possible, will permit the carrier that is economically justified to survive and leave failure alone to those not economi-

* Chairman, Committee on Interstate and Foreign Commerce, National House of Representatives.

cally justified. To boil the situation down, we have a newly developed, highly competitive situation between various transportation agencies which calls for co-ordination to protect our national transportation system and conduct it under fair rules of competition. We also have a need of regulation so exercised that each of these agencies, within its legitimate field, may receive a fair and just reward for the useful service it is performing to the nation. These purposes must be among the objects of federal regulation if we are to face the situation candidly.

In the Transportation Act of 1940, Congress wrote a declaration of a national transportation policy. This is the first broad declaration of a national policy for transportation that has been written in the laws of our country. It is the most modern statement of the purposes of regulation that has so far found its expression in our federal laws. Several purposes are declared. One is to provide for fair and impartial regulation of all modes of transportation. Another is to recognize and preserve the inherent advantages of each mode of transportation. Still another declared purpose of our regulation is to promote safe, adequate and efficient service as a duty of the carrier to the public. A fourth purpose is to foster sound economic conditions in transportation and among the several carriers. Then again, recognizing the need of carrier protection, the declaration of purpose commits regulation against unfair or destructive competitive practices. There is a further declaration of purpose to encourage fair wages and equitable working conditions. Then this declaration concludes by asserting that the end of this regulation is to develop, co-ordinate and preserve a national transportation system by all these agencies to meet the needs of commerce and our national defense.

Rate Regulation

Like all the rest of us, carriers live off their income. Rate regulation goes to the heart of the problem of co-ordination; to the question as to what units of transportation shall survive; and it is the primary factor of regulation that affects the balance sheet. Regulation is neither the cause nor the cure of many transportation ills. Transportation has all the problems common to the business world and its public relations besides. Under our system of regulation, when all is said and done, we must turn to the Interstate Commerce Commission and trust much to its members, to whom the serious responsibilities of regulation must be confided. Theirs is an unspectacular work, the plodding burden of responsibility.

Some day, perhaps 20 or 30 years from now, the nation will reach its final verdict on regulation. It may be proclaimed a failure, it may be proclaimed a success, it may be decided to be a necessary method, but of an indifferent success. I trust that the final verdict will pronounce it a satisfactory method of preserving our transportation system and doing justice to the carrier and the public. To me, the only course available at the present time is to support and improve our system of regulation.

Board of Investigation

The Transportation Act of 1940 provides for the appointment by the President of a Board of Investigation and Research to investigate and report to Congress as to the relative economy of our different transportation agencies, with a view of determining the service for which each type of carrier is best fitted. It is also the duty to investigate the extent and effect of public subsidization of rail, motor and water carriers; also the

extent and effect of taxes imposed upon such carriers. This Board is authorized to investigate any other matters it deems important for the improvement of transportation conditions.

In substance, this board is to have the responsibility of making a thorough investigation to furnish basic information which should be useful in working out the co-ordination of our transportation facilities and moulding these various agencies in one consistent rounded-out national system of transportation. The creation of this board recognizes the need of preserving the inherent value of each type of transportation and co-ordinating them to each other for the benefit of the nation. A thorough, impartial and courageous investigation of the type authorized may make a useful contribution toward the ultimate solution of our confused transportation problems.

The combined carrier agencies of the United States in their speed, service and efficiency constitute the greatest transportation system in this world. It is one of the great institutions of America. In the course of its evolution, it has reached a stage where it needs more complete and more practical co-ordination in order that it may reach out in fuller dimensions and serve the transportation needs of this country. It needs stabilization with a fair reward based only on the economic value of its services. There is only one agency that can accomplish this task—the government of the United States.

Signals and Interlocking

H. G. Morgan, Chairman*

This committee has two assignments, namely, (1) to report on developments in railway signaling, and (2) to keep the association informed of the principal current activities of the Signal section, A. A. R. Regarding the first assignment, the committee stated that no developments worthy of mention had taken place since the 1940 meeting, but a progress report, submitted as information, was presented on the second assignment.

This report included a list of 27 subjects on which committees of the Signal section made reports at its 1940 meeting. In addition, it listed the revised and new specifications, drawings, requisites, instructions and miscellaneous matter that have been submitted to letter ballot, and also the matter that has been submitted to letter ballot for removal from the Manual. The committee also called attention to the fact that there are now available 23 of a series of 24 pamphlets on American railway signaling principles and practices that have been prepared for the education of signal men and others desiring to study this subject.

This report was received without comment.

Report on Standardization

F. L. Nicholson, Chairman†

This committee was instructed to report on three assignments (1) What A. R. E. A. recommended practices should be advocated for general use on railways; (2) what A. R. E. A. recommended practices should be sponsored as subjects for national standardization; and (3) to maintain contact with standardization bodies and keep the association informed on important matters developed by such contact. In reporting on the first assignment, the committee called attention to the fact that it had submitted at the 1940 convention a tabulation of recommended practices and urged their adoption insofar as possible by the railroads represented in the association. No additional recommendations were made this year. Also, no recommendations were made under the second assignment.

In reporting on the third subject, the committee called attention to the fact that at the 1940 convention it had submitted a list

* Signal Engineer, Illinois Central.

† Chief Engineer, Norfolk Southern.

of members representing the association on the committees of the American Standards Association and the American Society for Testing Materials. This year the committee listed a number of changes that had occurred in the representation of the A. R. E. A. on the committees of the A. S. A. and of the Association of American Railroads on the Standards Council of the A. S. A. Also under the third assignment the committee listed a number of new standards or revisions of existing standards that had been reported by the Canadian Engineering Standards Association, named a number of standards that have been the subject of discussion by appropriate committees during the last year, and listed changes in representation that had occurred on the committees of the A. S. T. M.

In addition, it was noted that the report of Committee A1 on Steel of the A. S. T. M., that was presented at the 1940 convention, included five new tentative specifications covering products used extensively by the railroads. Also, an addition was made in the carbon-steel specifications for general industrial use, providing a grade for use in bridges, with a minimum tensile strength of 66,000 lb. per sq. in. and a yield point of 33,000 lb. per sq. in. Reference was also made to the fact that Committee C1 on Cement of the A. S. T. M. had recommended new specifications for Portland cement, which provide for five types.

The report was received without discussion.

Economics of Railway Location and Operation

H. M. Stout, Chairman*

This committee submitted progress reports, as information, on 6 of its 14 subjects. Under Revision of the Manual, the committee reported that, in collaboration with the Signal section, Engineering division, A. A. R., it had undertaken a new study of the cost of stopping and starting trains, preliminary to making recommendations regarding the material now in the Manual.

More Intensive Use of Existing Railway Facilities

The committee devoted its report on methods for obtaining a more intensive use of existing railway facilities to a description of the plan that has been placed in effect by the Association of American Railroads to insure the maximum use of railroad facilities and equipment at the Atlantic and Gulf ports. This plan is designed to achieve this end through the co-operative efforts of individual railroads, shippers and receivers of freight and the steamship companies, and thus to avoid a repetition of the congestion and delay to railroad traffic that occurred during the World War. After citing figures showing the number of cars that were delayed short of their destination late in 1917, the committee stated that the significance of these figures lies in the fact "that the use of railroad equipment for storage purposes, due to inability to release cars at destinations, was a major cause of the congestion, and that congestion can be prevented by avoiding such misuse of railroad equipment."

The A. A. R. plan, says the committee, was placed in operation in November, 1939, because of the probability that a substantial increase would take place in the movement of export freight. Under this plan the position of manager of export traffic, with headquarters at New York, was established, with complete authority with respect to the supervision of any control placed on traffic moving to or through any port. At each of the principal Atlantic and Gulf ports, local committees, consisting of representatives of the ports and of the railroads entering them, have been created. Each of these committees keeps closely in touch with the situation and submits written detailed reports to the manager of port traffic at regular intervals, advising him regarding conditions at the particular port.

The committee stated that, because of the heavy movement of freight through the Port of New York, special attention has been given this area. Here, a daily report is received by the secretary of the General Managers' Association, giving detailed information regarding traffic conditions at the port. This information is passed on to the manager of port traffic, together with certain supplemental information. In addition, conferences are held regularly between representatives of the steamship companies and the railroads for the discussion of mutual problems

pertaining to the handling of lighterage freight in the New York district.

More Economical and Efficient Railway Operation

In dealing with its assignment to develop methods or formulas for the solution of special problems relating to more economical and efficient railway operation, the committee submitted a report on the economic relation between track structures and the traffic to be handled, which supplements previous reports that have been presented on this sub-topic. The principal element of this report was a chart showing the economical limitations of various weights of rail as they are governed by traffic density. The chart is described in the text of the report and its use is illustrated. The committee stated that if similar charts are prepared by individual roads, using local factorial values, they will be found to provide a simple solution to many rail weight problems.

Effect of Volume of Traffic on Operating Expenses

Reporting on its assignment to determine the effect of the volume of traffic on railway operating expenses, the committee noted that in previous reports it had shown, by the analysis of mass statistical data, the effect of the volume of traffic on operating expenses as a whole. It expressed the opinion, however, that a method by means of which estimates could be made of the effect of traffic volume on each of the general expense accounts under the conditions pertaining on individual railroads would be of considerable practical value. Explaining that the association had adopted a prior report containing a method of determining the effect of traffic density on maintenance of way and structures expense, and that a report on the effect of volume of traffic on maintenance of equipment expenses had been compiled by the Mechanical division, A. R. R., the committee submitted as information a method for determining the effect of volume of traffic on transportation expenses.

Pointing out that gross revenue, the common measure of the volume of railway traffic, cannot in itself be used as a measure of transportation expense, the committee said that the first step in determining the effect of traffic volume is to establish the relationship between revenue and certain units which can be used to measure transportation expenses, as expressed in the various primary accounts. For the purposes of the method, the committee stated that gross revenue must be broken down into its freight and passenger increments. Furthermore, since the relationship between freight and passenger revenues shows considerable variation on different railroads, and as this relationship has considerable effect on operating expenses, it must be determined for the particular property under consideration.

In the next step, revenue is related to the transportation units which cause expense, such as net ton-miles, gross ton-miles, etc., and a form for a table was submitted by means of which this can be done conveniently by the use of a test period. Then the primary accounts of the transportation group of expenses are related to the transportation units, and in this connection methods are given for determining the probable variation of the primary accounts with traffic volume. Having determined the nature of these variations for a particular property, they may be used to estimate future transportation expenses for any given variation in traffic.

High Speed and Operating Expenses

In reporting on its assignment to determine the effect of high speed on railway operating expenses, the committee pointed out that increases in speed require increased fuel and water consumption for steam locomotives and that the higher the speed the greater is the increase in fuel and water consumption, and also, that increases in speed have a material effect on power requirements.

In order to show the effect of high speed on fuel and water consumption and power requirements, the committee compiled two tables for three different types of service, namely, passenger trains, coal and ore trains, and manifest freight trains. These tables constitute a composite summary for six different groups of locomotives, based on the horsepower per ton of weight on the drivers, and give the average weight of train for any maximum speed and the average speed, exclusive of time stopped, for various distances between stops; also the horsepower-hours per 1,000 gross ton-miles of trailing weight. Examples were given to show how these tables can be used to determine the effect

* Assistant Valuation Engineer, Northern Pacific.

of increased train speeds on coal and water consumption and power requirements.

Included in the report was an exhibit containing a more detailed discussion of the factors involved and conditions to be considered if a detailed study of the effects of proposed increased speeds is desired. This exhibit consists largely of a series of tables that establish the relation which exists between certain of the factors which must be given consideration when a study is being made of the cost of operating high-speed trains. Thus, the tables show the relation between the weight of the train and the weight of the locomotive at any desired speed on various grades for the three classes of trains mentioned previously. They also show the relation between the maximum and average speeds for trains operating on level tangent track with frequent stops, and the horsepower-hours required to obtain these average speeds.

In developing the tables for steam locomotives, it was necessary to take account of some of the factors connected with the design and also some of those that have to do with operation; much of the text of the exhibit is devoted to a presentation of explanatory notes regarding these factors in case they are desired. The committee presented the following conclusions:

It will appear from the application of the data contained in these tables that high speed has a widespread influence not only as regards fuel and water consumption, crew wages and way and equipment maintenance, but also as regards capital expenditures. Actually, the operating expenses and capital expenditures will very likely be greater than those anticipated, based on the theoretical data presented in this report.

Railway Electrification

As its report this year on the economics of railway location and operation as affected by railway electrification, the committee presented a tabulation giving data on the electrification of railroads in Mexico, Cuba, Costa Rica, Argentina, Bolivia, Brazil, Chile, Venezuela, Australia and New Zealand. This table shows the locations of the electrified sections, the gage of the track, the total number of miles electrified, and gives information concerning tunnels, ruling grades, systems of electrification, kinds of traffic involved, number and capacity of motive-power units, energy requirements and reasons for electrification.

Similar tabulations for the United States and Canada had previously been presented. The committee explained that it was its intention to secure data on all electrified lines of the eastern hemisphere also, but that war conditions have made this undertaking practically impossible of fulfillment for the time being.

Freight Train Resistance

The investigation of train resistance of freight trains under various conditions of loading and speed is a new assignment for this committee and was reported on for the first time this year. In a foreword to the report, the committee stated that its work in this connection would consist of investigating all available data bearing on the subject, evaluating their appropriate application under modern conditions and, if possible, presenting a final preferred method with modifying factors to meet specific conditions.

In its report on this subject the committee first submitted a discussion of the nature of train resistance, which it sub-divided between (1) those resistances inherent to all train operation, known as inherent resistance, and (2) those encountered only on grades, curves, etc., called incidental resistances. The characteristics of each of the types of train resistance under these two sub-headings were described in detail. As a matter of historical interest, the committee included in its report a list of the formulas, together with their sponsors, that have been developed in the past in an endeavor to determine the resistance of different types of trains.

Next, the committee pointed out that various investigations of train resistance have been conducted in an effort to evaluate the effects of such variables as curve resistance when modified by rail lubrication, rail weight, track construction, car weight, etc., and the results of each of these investigations were summarized. The committee presented the following conclusions:

The Davis equation, with Totten-recommended modifications applied when streamlining refinement introduces marked resistance changes, remains the most reliable and widely accepted method for calculation of train resistance. This committee pro-

poses to continue its search for road test data, particularly as they have been developed for freight service application—to weigh all factors—to modernize equations of merit which no longer accurately represent present operating conditions—and, if possible, to submit a preferred general method for calculating train resistance for guidance in such problems as the establishment of locomotive tonnage ratings.

The entire report of this committee was received without discussion.

Waterways and Harbors

G. P. Palmer, Chairman*

In reporting on its eight assignments, this committee presented progress reports on two subjects and final reports on two others, with both of which it offered material for inclusion in the Manual.

Breakwaters, Bulkheads and Jetties

At the 1940 convention this committee presented definitions of breakwaters, bulkheads and jetties for inclusion in the Manual, but they were withdrawn as a result of objections from the floor. During the year these definitions were revised in a number of respects and were again submitted for inclusion in the Manual. They are as follows:

Breakwater.—A structure to afford shelter from wave action.

Bulkhead.—A structure to prevent sliding of natural ground or fill material into the water; the limiting wall or structure along a waterfront.

Jetty.—A structure in the mouth of a river, at the entrance of a harbor, or elsewhere, to control the waterflow currents, to maintain depth of channel, to protect harbor or beach.

These definitions were adopted without discussion.

Protective Casings for Pier Structures Under Water

The committee reported progress in the work of assembling data relative to its study of metal and other protective casings for pier structures under water. It stated that considerable experimental work has already been done and that several shield installations are under observation. The principle of the use of shields, said the committee, is based on the fact that marine borers cannot live below the mud line. Hence, if the mud line is raised above the attack line, the timber is protected against the borers. The committee stated that experiments with shields have been under way for about nine years with encouraging results, and that a variety of shields are now available commercially.

Seawalls and Ocean Shore Protection

In reporting on seawalls and ocean shore protection, including the effect of wave action and ice, the committee offered for inclusion in the Manual a definition of "groin," as follows:

Groin.—A barrier extending into the water from a beach to arrest traveling sand and shingle and to give protection against wave-wash or current. A small jetty.

This definition was adopted.

In the remainder of its report, which was offered as information, the committee submitted a brief discussion of the history of seawalls and ocean shore protection, and presented an analysis of the different types of such protection and the causes of shore disintegration. It classified ocean-shore protection into four types, as follows: (1) Artificial constructions which break the force of the waves before they reach the shore; (2) Those which consolidate and elevate the shore itself, so as to enable it to resist the action of the waves; (3) Those which make or assist the accumulation of sand or shingle upon the shore; and (4) permanent breakwaters, which act as islands in the offing and exclude the waves.

The proper use of these methods of protection, said the committee, requires a careful investigation into the various forces which produce the conditions causing shore erosion. There are four such forces which were listed as follows: (1) Sub-aerial agencies; (2) waves; (3) wind currents; and (4) tidal currents. Each of these was described in some detail in the report. The committee included in its report a brief bibliography

* Engineer Maintenance and Construction, Baltimore & Ohio Chicago Terminal.

of literature on ocean shore protection. It offered the following conclusion:

Seawalls of various designs and groins may be properly used in protecting shores and beaches after careful studies of all conditions have been concluded to enable the selection of an adequate design of seawall or groin, or a combination of both.

Life of Steel Casings in Sea Water

One of the assignments of this committee is to report on the reasonable life of steel casings immersed in sea water, and in a report on this subject, submitted as information, it expressed the view that its study could be pursued to greater advantage if it were deferred until an investigation of the same subject that is being made by the War department is more nearly complete. However, the committee presented figures showing the loss of weight in steel subjected to "simple exposure," which were developed in a test conducted on the Passamaquoddy tidal power project by the U. S. Corps of engineers and presented in an interim report. In addition, the committee cited a summary of conclusions on the corrosion of iron and steel specimens, contained in a report of a committee of the Institute of Civil Engineers (England), which has been investigating the deterioration of structures in sea water since 1916.

The committee also referred to certain observations made by Dr. William F. Clapp in connection with an investigation of steel corrosion in salt water. Further, it reported that it had been given an opportunity to examine certain war department reports, especially a partial report on an investigation of steel sheet piling. Even though this was only a progress report, and the conclusions must, therefore, be considered as being tentative, the committee expressed the opinion that it was of value to the profession. From this report the committee presented the following quotation: "It appears * * * that where piles are subjected to frequent wetting from salt water and spray, there is little difference in the rate of deterioration of plain steel and copper steel. In brackish water, the copper steel appears to have a rate of deterioration slightly less than that of plain steel."

Report of Committee on Highways

J. G. Brennan, Chairman*

This committee submitted reports on five of its six assignments, four of which were progress reports, offered as information, while one was a final report and included recommendations regarding Manual material.

Revision of Manual

The committee is making a thorough study to determine if the present standard for reflectorized crossbuck signs, calling for white letters on a black background, should be reversed so that the letters will be black on a white background. Representatives of the committee have been designated to confer with representatives of Committee VIII of the Signal section on the matter and to make such tests and observations as may be necessary. It is expected that a report will be submitted at the next convention.

Highway Crossings at Grade Over Railway Tracks

In a brief statement on its assignment pertaining to designs and specifications for highway crossings at grade over railway tracks, the committee stated that it had under consideration a design and specification for a solid plank crossing but that doubt had been raised as to whether there was a need for it. However, the committee expects to continue its study with the idea of developing a design and specification for a plank crossing for use where crossings of this type will prove economical.

Merits of Various Types of Crossing Protection

In its assignment to investigate the comparative merits of various types of grade-crossing protection, the committee reported that it had confined its work during the last year to assembling data on various types of sheet reflectorized crossbuck signs which have been developed for use at grade crossings. It is claimed,

said the committee, that these signs can be manufactured in quantity lots for about one-tenth the cost of reflector button crossbuck signs.

The committee then listed the materials to which it had given consideration and described them briefly. They include Mir-O-Ray, Alzak, Scotchlite Reflectors, Permi-base, the Decalcomania transfer process, and Scotch Flasher.

Drawings of Grade Crossing Signals

In connection with its assignment to "prepare drawings of typical locations for grade-crossing signals for various degrees of crossing angles," the committee reported that during the year it had endeavored to develop drawings for the location of crossing-light signals. However, it is the consensus of the committee that each case must be decided on its merits, and that requisites for the location, number and arrangement of automatic signals, automatic gates and auxiliary signs for railway-highway grade-crossing protection should be developed rather than drawings. Accordingly, it recommended that the assignment be changed to read as follows: "Requisites for the location, number and arrangement of automatic signals, automatic gates and auxiliary signs for highway grade-crossing protection."

Methods of Protecting Highway Crossings

A set of instructions for the use of highway department employees was submitted by the committee in connection with its assignment to recommend methods of protecting highway crossings and flangeways against obstructions and damage caused by the use or passage of highway work equipment. The instructions are designed to govern the conduct of highway employees and the operation of highway equipment at grade crossings, with the objective of avoiding accidents. The committee recommended that the instructions be adopted and printed in the Manual, and that the co-operation of the American Association of State Highway Officials be enlisted for the purpose of getting the instructions adopted as recommended practice for state highway departments.

The committee's recommendation regarding the adoption of the instructions was approved.

Report on Electricity

H. F. Brown, Chairman*

This committee presented progress reports, submitted as information, on both of its assignments, which are to keep the association informed (1) of developments in the application of electricity to railway service; and (2) regarding the principal current activities of the Electrical section, Engineering division, A. A. R.

Under its first assignment the committee noted that there had been few new developments during the last year but that there had been a widening of the usefulness of previous developments. For instance, it reported that for electrified roads using direct current, the ignition rectifier is proving useful, that plate-type rectifiers for charging batteries are being favorably received, and that the alternating-current transformer-type welder is finding broad fields of usefulness in railroad shops. It also referred to the increased advantages of fluorescent and high-intensity mercury-vapor lighting resulting from the lower cost of lamps and accessories; the availability of electrically-refrigerated drinking-water coolers for passenger cars; the floodlighting of highway grade crossings; the use of tubular-type track switch heaters; the efficiency of the electrostatic air cleaner for use where fine dust or pollen is objectionable; and the fact that the Diesel-electric switching locomotive has demonstrated its merits from the standpoints of both economy and availability.

In its report on the second subject, the committee, in accordance with past practice, gave brief synopses of the reports presented by the different committees of the Electrical section at its last meeting. The subjects reported on this year were as follows: Power supply; electrolysis; electric heating and welding; applications of motors; clearances for third-rail and overhead working conductors; track and third-rail bonds; illumination; high tension cables; and the application of corrosion-resisting materials to railroad electrical construction. Reports on

* Engineer Grade Crossings, Association of American Railroads.

* Assistant Electrical Engineer, New York, New Haven & Hartford.

all these subjects were published in full in Bulletin 419, dated September-October, 1940.

This report was received without comment.

Uniform General Contract Forms

W. G. Nusz, Chairman*

This committee presented reports on two of its five assignments, offering for adoption a form of agreement for commercial signs on railway property and a form of agreement for unloading liquefied petroleum and other gases. Under Revision of the Manual, the committee stated that a subcommittee had been collaborating with Committee 1—Power Supply, of the Electrical section, in a comparison of the present form of agreement for the purchase of electrical energy for other than traction purposes with a tentative form drawn up by the Committee on Power Supply, but that it was deemed desirable to continue the study before proposing any revision of the form now in the Manual.

Commercial Signs on Railway Property

Last year a form of agreement for commercial signs on railway property was submitted as information and for discussion. Minor changes have since been made and the form was submitted this year with the recommendation that it be adopted for printing in the Manual. The agreement contains paragraphs on license, display copy, permits and taxes, cost and maintenance, changes of structures, removal, rentals, liability, risk, term, and assignment.

Unloading Liquefied Petroleum

The form of agreement for unloading liquefied petroleum and other gases that was submitted by the committee was prepared at the request of the Association of American Railroads and has received the approval of its law department and the endorsement of the General committee of the Engineering division. This agreement, which was submitted for adoption and printing in the Manual, contains paragraphs on grant, ownership of facilities, use by others, permits and licenses, A. A. R. circulars and instructions, clearances, liability, assignment, and duration and cancellation.

Both forms were adopted for inclusion in the Manual.

Co-Operative Relations with Universities

Elmer T. Howson, Chairman†

This committee was organized shortly before the last convention and this year it presented its initial report, which was preceded by a statement of the scope and purpose of the committee's work. In this statement, the committee pointed out that its work during the last year has been largely exploratory and has consisted primarily of the formulation of measures to gather the information required in fulfilling its assignments. It went on to review in some detail the entire problem presented by the need for attracting capable college-trained men into the railroad industry. As a preliminary to this discussion, attention was called to the necessity for reducing railroad transportation costs to meet the competition of other systems, and also as a means of helping industry to compete in foreign markets with other countries with lower wage scales. These demands, the committee said, will impose added burdens on railway management.

Pointing out that a far larger proportion of the more promising young men are now enjoying the privileges of a college education than at any previous time, the committee raised the question as to whether as many of these men are being attracted to railroad service as was true a generation ago. Answering this question, it pointed to the fact that the construction era of railroading, which provided a major outlet for college-trained civil engineers, has come to a close and that, as a result, many colleges are openly discouraging their graduates from entering

railroad service. Conceding the reduction in new-line construction activity, the committee stated, however, that the present need for the rebuilding of facilities to meet new and changing conditions, and to effect greater economy and efficiency in transportation, calls for the display of analytical ability as great or even greater than that of the pioneer locating and construction engineers.

Because of the different nature of the problems confronting railroad engineers today, their solution calls for ability of a different character, requiring a new approach to the problem of education. But the committee contended that no industry so basically important as the railroads can fail to provide opportunity for analytical and executive ability of a high order. It noted that, while it is contended by colleges that the railways fail to meet the competition of other industries for such talent, the railroads, on the other hand, hold that the colleges have failed to revise their courses of instruction to keep pace with the changes in railway operation and that, as a result, the graduates of today are not prepared in viewpoint or training for their needs of today. The committee concluded its statement of scope and purpose as follows:

"Your committee understands that, in re-establishing this committee, the Board of Direction of this Association had in mind the importance of (a) bringing about the education of a capable group of young men in the railway problems of today and the days that are ahead, and (b) providing for these men opportunities in the various branches of railway service comparable with those presented by other industries. Through the work that has been initiated by the sub-committees, it is hoped to bring about a recognition among college and university authorities that the railway industry does offer opportunities to a limited number of properly trained young men equal to or greater than those existing elsewhere and a corresponding recognition among railway managements that it is to their interest to give the same or even greater consideration to the selection and development of their personnel that they do to their physical plant and its use."

The committee presented progress reports, which it submitted as information, on four of its seven assignments.

Value of a Technical Education

One of the assignments of this committee is to "develop means of bringing to the attention of railway managements the value of a technical education as a qualifying factor for young men desiring to enter railway service with a view to advancement." The committee's report on this subject was of a comprehensive nature and was designed to provide answers to the two questions—(1) Why should railway managements be interested in employing technically educated men? and (2) Why should technically educated men desire railway employment? In order that the answers to these two questions could be fully developed the committee first endeavored to show what the railway managements offer the young man with a technical or other college education and to present examples of what such young men have accomplished in the past when they associated themselves with railways.

First the committee quoted from a study made by C. E. Smith, vice-president, New York, New Haven & Hartford, to show the extent to which managerial and supervisory positions on railroads are occupied by college-trained men. Among other things, the study showed that on the 31 roads that were included in the investigation, the heads of the engineering and maintenance departments on 84 per cent of the mileage were college-trained civil engineers. Mr. Smith's study of the subject has convinced him that the chances that college-trained civil engineers have of getting to the top are seven times those of all other men entering railroading as a profession.

The report also quoted from a number of addresses that were presented by railway engineering officers before a meeting of the transportation section of the Society for the Promotion of Engineering Education, at Berkeley, Cal., on June 24, 1940. These officers and the titles of their addresses are as follows: M. C. Blanchard, chief engineer, Coast Lines, Atchison, Topeka & Santa Fe—"What the railways offer the engineering graduate"; J. W. Williams, chief engineer, Western Pacific—"What a railway expects in the engineering graduate"; and W. H. Kirkbride, chief engineer, Southern Pacific—"After Graduation—What?" Also included were excerpts taken from the 1940 report of the Transportation committee of the Civil Engineering

* Assistant Engineer, Illinois Central.

† Vice-President and Western Editor, *Railway Age*.

division of the S. P. E. E., of which committee Mr. Howson is chairman.

It was pointed out that a limited number of railways have offered engineering graduates employment as student apprentices. Outstanding among these lines are the Pennsylvania and the Southern, and in a future report the committee plans to describe in some detail the policies of these and other railways and to give their opinions of the results obtained.

To obtain the railway executives' point of view regarding its subject, the committee submitted a list of five questions to a number of such executives, all with technical educations and members of the association. Presented in the report were partial quotations from the replies of L. W. Baldwin, chief executive officer, Missouri Pacific Lines; Ralph Budd, president, Chicago, Burlington & Quincy; J. R. Downes, vice-president, Pennsylvania; C. E. Denney, president, Northern Pacific; E. M. Durham, Jr., chief executive officer, Chicago, Rock Island & Pacific; H. M. Lull, executive vice-president, Southern Pacific Lines; H. R. Safford, senior executive assistant, Missouri Pacific Lines; Robert E. Woodruff, trustee and chief executive officer, Erie; and F. E. Williamson, president, New York Central.

Based on the information contained in its report, the committee made the following preliminary observations:

(1) Railway managements should be interested in giving employment, training, encouragement and opportunity to desirable college men in order to provide a reserve from which to draw the future supervising officers, managers and executives, and in that manner enable the railways to meet the competition of other transportation agencies and keep abreast of industry in general.

(2) A desirable college man is a young man who, in addition to his educational qualifications, has character and loyalty, has initiative and analytical ability, is a natural leader and organizer, is aggressive, is willing to take and execute orders and, finally but of major importance, is not above starting at the bottom of the ladder or afraid of hard work.

Stimulate Interest in Transportation

Reporting on its assignment to stimulate a greater interest in the science of transportation among university and college students, the committee offered suggestions regarding a number of different ways in which this can be done. These include campus meetings, with informal addresses on problems of the railroads and other transportation agencies; student inspection trips to railroad operations; a properly equipped library augmented with museum pieces; and the opportunity for students of engaging in summer employment at common labor.

The committee proposes to develop this subject further during the next year "to determine specific means and methods of obtaining a fuller appreciation among all college students of the basic importance of the transportation industry in our economic order."

Facilities for Research Work

One of the assignments of this committee is to "develop means whereby facilities of the universities may be made more directly available for research work of the association and the railway industry. It is the thought of the committee that its first activity in regard to this assignment should be to develop, by means of a questionnaire, information regarding the present facilities, personnel, activities and interest of the various schools bearing on railway problems, as well as a compilation of the subjects already investigated and the reports that are available for distribution.

Accordingly, such a questionnaire was distributed among 125 schools, but the committee explained that, for various reasons, the response to the questionnaire was not yet complete. The committee feels that the information obtained through the questionnaire will be interesting and valuable to the railways when it is made available to them in future reports.

Co-Operation with College Students

To obtain information relative to its assignment to "co-operate with organizations of university and college students engaged in study or discussion of engineering or transportation matters," the committee invited the deans of 17 colleges to submit suggestions. A total of 14 replies were received, and a brief digest of the suggestions contained in them was presented in the report. In condensed form, these suggestions are as follows: (1) Lectures before student gatherings by railroad men engaged in various branches of the service; (2) the employment of

students and graduates; (3) the conduct of research work on railway problems through college laboratories by and with students; (4) distribution of railroad publications and literature bearing on transportation to college libraries; and (5) English composition assignments covering certain features of railroad transportation. In connection with the latter suggestion, it is thought that the A. R. E. A. might establish cash prizes or medal awards to encourage competition.

Following the presentation of the report, which was received without discussion, Acting-President Bond introduced a group of 35 engineering students from Notre Dame and the Universities of Illinois, Michigan and Wisconsin, who were attending the convention at the invitation of the committee.

Water Service, Fire Protection and Sanitation

B. W. DeGeer, Chairman*

This committee submitted progress reports on three subjects and final reports on three others, all of which were offered as information except a progress report on Revision of Manual, which contained material for inclusion in the Manual.

Revisions of Manual

The committee noted that in the specifications for steel water and oil tanks in the Manual, the first two sentences of Paragraph 11 now reads as follows: "For plates not more than $\frac{3}{8}$ in. thick, $\frac{5}{8}$ -in. rivets shall be used. For thicker plates, $\frac{3}{4}$ -in. rivets shall be used." To make this specification more definite and complete, the committee recommended that the following be added as a third sentence: "For thin plates used in roof construction, $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{4}$ -in. thick, use, respectively, $\frac{3}{8}$, $\frac{7}{16}$ and $\frac{1}{2}$ -in. rivets."

This revision was approved.

Pitting and Corrosion of Boiler Tubes and Sheets

The committee reported that it had continued its co-operation in the study of embrittlement that is being conducted at College Park, Md., by the Bureau of Mines under the sponsorship of the Association of American Railroads with the National Feed Water Studies committee. This year's report of the committee on this subject consisted of an abstract of a report on the study that was presented by Dr. W. C. Schroeder of the Bureau of Mines before the Mechanical division of the A. A. R. in June, 1940.

This report summarized the present status of the investigation in the definite conclusion "that embrittlement, or intercrystalline corrosion as it is now called, is not produced in a boiler by direct action of the water, but by a concentrated solution formed from it in capillary spaces in rivet seams in a stressed area." This concentration, and subsequent cracking, result from minute leakage into a stressed area of the seam. The cracking is independent of water conditions and depends on the nature of localized stresses resulting from cold working or other practices beyond the control of water service engineers.

After referring briefly to the use of embrittlement detectors, the report stated that the effectiveness of sulphite liquors and tannin compounds as a means of preventing corrosion is sometimes minimized when sodium sulphate and sodium chloride are present in any appreciable amount in the boiler feed water. The results of the studies to date, said the report, indicate that a boiler constructed to resist intercrystalline corrosion will need no other protection. The welding of boiler seams and the use of various types of alloy steel in the construction of boilers were mentioned as offering possibilities in the prevention of corrosion. The committee concluded that "the evidence obtained to date from actual railroad operation indicates that a combination of good construction and shop practice greatly reduces the possibility of costly failures from intercrystalline corrosion, or cracking."

Prevention of Corrosion in Steel Tanks

The committee's report on cathodic protection for the prevention of corrosion in steel tanks was devoted to a discussion of the use of this method as a means of treating the interiors of

* Engineer Water Service, Great Northern.

such tanks. The committee declared that the life of the 6,000 steel water tanks that are now in railroad service is being reduced materially by the loss of steel as a result of under-water corrosion. Following a brief discussion of the cost of painting the interiors of water tanks, the committee explained the electrochemical theory of under-water corrosion.

Turning to a discussion of cathodic protection, a recent development, the committee explained that this process is based on the principle of an electric cell in which the current flows in one direction from the positive electrode through the water in the tank, which acts as an electrolyte, to the cathode, or negative electrode. The steel tank shell becomes the cathode and is protected by a hydrogen film that is deposited on its surface. Details regarding the application of the method were given and a list and description of the equipment required were included. The report also discussed the results obtained by the method, the extent of its use and the cost, and other considerations. The following conclusions were submitted:

Cathodic protection of steel water tanks against the corrosive action of water is still in the experimental stages; however, the indications are that some benefits are being obtained.

Because of the limited period of operation in railroad water service, more time will be required to demonstrate whether cathodic protection is the satisfactory method to prevent corrosion in steel water tanks.

Effect of Lubricating Oil in Boilers

Reporting on the effect of lubricating oil in boilers and methods of correction, the committee first described the processes by means of which lubricating oils find their way into boiler water, and pointed out that the nature of the effects will depend on the alkalinity, the content of dissolved solids, and the degree of floc in the boiler water. It was pointed out that the presence of oil in boiler waters of low alkalinity may have various detrimental results, whereas in boiler water whose alkalinities are maintained at a minimum of 20 per cent of the dissolved solids, the effect of the oil content encountered ordinarily appears to be slight.

A method of analyzing feed water and boiler water for oil content was given, after which the committee described several corrective measures for use where lubricating oil in a boiler is causing harmful results. It stated that where oil is introduced with condensate from the engine or the stoker, the best corrective measure is that of adjusting the lubricator feeds, while careful inspection and maintenance of the pump packing and the proper feeding of oil to the pumps should be effective remedies if oil becomes mixed with the water in the feed-water pumps. Reference was also made to the use of oil strainers or straps in the feed-water supply line, periodical cleaning of the tanks as a means of preventing oil in the tender water from getting into the boiler, and the treatment of feed water with suitable alkalies and coagulents as a means of correcting boiler troubles caused by oil.

Removal of Silica From Boiler Feed Water

In its report on the removal of silica from boiler feed water, the committee pointed out that the presence of silica in such waters is particularly undesirable since it may react with the calcium present to form a hard dense scale deposit of calcium silicate. It was also noted that, with the trend towards higher boiler pressures and to the use of Diesel equipment having heating surfaces that are especially sensitive to scale formations, silica scale has become a problem of increasing importance. The nature and formation of silica scales and their high insulating value were also discussed.

The committee stated that two fundamental methods have been used to prevent silica scale, namely, (1) the internal treatment type, through a suitable physical-chemical treatment of the boiler feed water, and (2) the external treatment type, which removes the silica from the feed water before it enters the boiler. In the first method, which the committee said had been satisfactory for particular operating conditions and territories, the typical chemicals used are sodium phosphates, iron compounds, sodium aluminate, and organic compounds such as starches, tannins, lignins, tannic acid and the glucosides.

Turning to a discussion of external treatment as a means of preventing silica scale, the committee stated that, in general, methods which have been used or proposed specifically for silica removal have been for the most part unsuccessful except

in certain isolated cases. The one general exception to this statement is presented by the metallic oxides and hydroxides, particularly those of iron and aluminum. The use of iron, magnesium and aluminum compounds for this purpose was then described in some detail. Included in the report was a description of a complete softener that had been installed at Savannah, Ga., for silica removal. Chemicals employed by this plant include lime slurry, sodium aluminate, alum solution and tannin; it is reported that the results have been gratifying in the prevention of silica scale formation.

Fire Protection and Insurance Section, A. A. R.

In its first report on the principal current activities of the Fire Protection and Insurance Section of the A. A. R. the committee noted that the formation of such a section became effective on April 1, 1939. The new section was created by absorbing in the A. A. R. the Railway Fire Protection Association, which had functioned since 1913 as an independent organization of railway employees engaged in fire protection and prevention activities, with an associate membership of interested industrial and insurance representatives. The committee described the objectives of the new section and listed its standing committees. Committee work in the section thus far has been devoted to a revision of the Railway Fire Protection Association Hand Book, which will now become the Hand Book of the Fire Protection and Insurance Section of the Association of American Railroads. The report was received without discussion.

Report of Committee on Ties

John Foley, Chairman*

This committee presented brief reports on three of its six assignments, all of which were offered as information. No report was submitted on Revision of Manual.

Extent of Adherence to Specifications

In connection with its assignment to investigate the extent of adherence to specifications the subcommittee handling this subject reported that in June and November, 1940, it had examined the seasoning and creosoted stocks of six railroads at the yards of six wood-preserving plants in the Mississippi valley. All six of these roads obtain their supplies in Arkansas, Louisiana, Missouri, Oklahoma and Texas. Noting that the majority of the 3,000,000 ties observed were oak, with gum and pine next in number, the committee said that all of them had been purchased under A. R. E. A. specifications and marked to designate A. R. E. A. standard sizes.

The committee reported that, as a whole, the inspection left little to be desired, except on one road where some of the ties had been accepted when decayed, were undersize and were not well made. The sanitary condition of only one of the seasoning yards was found to be unsatisfactory. It was found that, in general, the stacking of ties had been well done, but in one yard it was reported that the number of misplaced stringers and of ties touching each other in the layers "reflected disregard for probable decay." Reporting on the results of its observations of tie stacks with different spacings, the committee said that the wider spacing did not result in more split ties than the closer spacing. Stating that all the locations visited in 1940 were under observation several years ago, the committee concluded that "the improvement in the ties and their care is so marked in most cases as to reflect considerable credit on those responsible for it."

Tie Renewal Averages and Costs

In accordance with its usual practice, the committee submitted tabulations of tie renewals and costs, the figures presented this year being for 1939 and the last five years. These tables were given advance publication in Bulletin 418, June-July 1940. They are based on data reported to the Interstate Commerce Commission by railroads in this country and to the association by the Canadian railroads. In presenting these figures, the committee pointed out that comparisons between railroads are practicable only when allowance is made for variations in practice which would influence certain costs. Furthermore, it stated that different prices at which ties are charged out are due not only

* Forester, Pennsylvania.

to certain factors listed in the proceedings but are affected by whether or not they include expenses for adzing, boring, incising or ironing any or all ties, freight on the shipment of the ties and the preservative to the treating plant, and inspection.

Dimensions of Ties

One of this committee's assignments is to investigate and report on the dimensions of ties and to bring up to date information in the 1924 and 1932 proceedings. In its report on this subject, the committee reviewed briefly the reports on the same subject that it had presented at the 1939 and 1940 conventions, following which it submitted a number of recommendations which were offered with a view to their adoption and inclusion in the Manual in 1942. These recommendations are as follows:

(a) The adoption of nine-foot ties and the discontinuance of the purchase of eight-foot ties as rapidly as practicable and economical.

(b) The use of nine-foot ties at least for lines of heavy traffic.

(c) The adoption of the nine-foot length whenever change is made from eight-foot length.

The report was received without comment.

Wood Preservation

H. R. Duncan, Chairman*

Reports were presented by the committee on three of its nine assignments, all of which were submitted as information. The assignments on which reports were presented included those on service test records for treated ties; piling used for marine construction; and destruction by termites and possible ways of prevention.

Service Test Records of Treated Ties

In accordance with past practice, the committee submitted the usual table showing the number of crosstie renewals per mile of maintained track for various railroads, which has been revised to include figures for 1939. Also included were reports on special test tracks maintained by a number of roads, including the Baltimore & Ohio, the Chicago, Burlington & Quincy, the City of Minneapolis Filtration Plant Railway, the Northern Pacific and the Southern. In addition, the report contained inspection reports for 1940, as submitted by the U. S. Forest Products Laboratory, covering the Hartford, Fair Grounds and University Avenue test tracks of the Chicago, Milwaukee, St. Paul & Pacific; also experimental ties in the tracks of the Public Service Company of Indiana.

Piling Used for Marine Construction

The committee's report on piling used for marine construction again consisted of individual reports on marine piling tests that are under way by various organizations throughout the world to determine the resistance of various woods, untreated or treated with different preservatives, to attack by marine organisms. This year reports were presented on the tests that are being conducted by the Panama Canal Zone, the Chemical Warfare Service, and the Sea Action committee of the Institute of Engineers, London. Also included were reports on tests that are being conducted in New England, in San Francisco Bay and in New York harbor.

In summarizing the results of the various tests, the committee reported that the test pieces prepared by the Chemical Warfare Service have not given the information that was hoped for, principally because the treatment was defective at the ends of the pieces, thereby giving the borers easy access to the interiors of the members. It added that it would probably be safe to say that the life of timber in badly infested water is somewhat prolonged by treatment with fuel oil to which 2½ per cent of dinitrophenol has been added. Also, the committee stated that the Panama Canal tests of timbers show clearly that there are a number of timbers which have a high resistance to attack by the species present in the Canal Zone.

Destruction of Termites and Ways of Prevention

Regarding its assignment to report on destruction by termites and possible ways of prevention, the committee stated

that it has continued its investigation but that there is little to add this year to the recommendations made in previous reports. However, it again stressed the importance of installing termite shields properly, saying that numerous cases have come to its attention where termites have gotten into buildings in spite of the fact that they were supposed to be protected by termite shields.

To be effective, said the committee, shields must cover the entire area of the top of the foundation and the horizontal part of the shield must project three inches from the edge of the wall or pier. At this distance from the wall it should be bent down at an angle of 45 deg. for another three inches. The committee also said that shields laid next to each other should be so soldered as to make a continuous piece of metal; otherwise termites will get in at the joints.

The report was received without comment.

Stresses in Railroad Track

Dr. A. N. Talbot, Chairman*

In a progress report covering its current activities, this committee reported that during the last year it had continued its work of analyzing and correlating the accumulation of data derived from its various tests and of preparing material for publication, as well as developing apparatus and carrying on field and laboratory tests. It pointed out that the seventh progress report of the committee had been published in Bulletin 418, June-July, 1940.

Much of the committee's report was devoted to descriptive and interpretive comment regarding the various tests that it has conducted or has under way. This part of the report included reference to the committee's measurements of stresses in rails under electric locomotives running at various speeds; tests of the bending moments developed by joints under various conditions; studies that were made to determine the effect on stresses in rails of a flat spot on a wheel or of batter in the rail surface; tests conducted with a fast freight locomotive to determine the effect of locomotive counter-balance on stresses developed in rails; and a series of tests that were made for the purpose of studying longitudinal web cracks in 112-lb. rail.

The committee also pointed out that development work on electrical measuring and recording instruments is being continued and that, as a more thorough knowledge of the operation of the apparatus is obtained, it has been found possible to add measurably to the effectiveness and ease of operation of the equipment by simplification or by making certain changes in it.

Dr. Talbot supplemented the written report with a detailed description of the tests on 112-lb. rail, which were conducted on the Denver & Rio Grande Western and the Illinois Central. These tests consisted of the measurement of the stresses in the webs of the rails under various locomotives operating at different speeds. As a result of these tests, it was concluded that the eccentric loading of rails is a factor in bringing about excessive stresses in the rail webs, but there is no known relation between this fact and the development of cracks in the webs. Dr. Talbot suggested that further tests be made and that a complete investigation be made of the fatigue strength of the metal in rail webs.

Economics of Railway Labor

G. M. O'Rourke, Chairman†

This committee submitted reports on four of its nine assignments, one of which was a progress report, while the other three were final reports. One of the latter contained material that was recommended for inclusion in the Manual; otherwise the committee's reports were submitted as information. Reference was made by the committee to a special report which it had prepared based on the testimony that was presented by the late Robert Faries before the Railroad Carrier Industry Committee during its investigation to determine the relationship between the

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wages of track labor and employment. This report was published in Bulletin 419 (September-October, 1940).

Reduction of Labor in Maintenance Work

One of the assignments of the committee is to make analyses of operations on railways that have made marked progress in the reduction of labor required in maintenance of way work. Its report on this assignment consisted of an analysis of a system of track maintenance that has been in operation on the Central of Georgia since 1932. Prior to that year, the practice on this road was to require each section gang to give one-fourth its track a full out-of-face lift each year, making necessary tie renewals, and gaging, lining, etc. The track was patrolled daily.

Since that year, a system, sometimes known as the "flat work" method, has been in effect, in which the section gangs work over all tracks in an orderly sequence once every 12 to 18 months. In this system, the section gangs perform nearly all work required in putting up the track, except that extra gangs are employed to lay rail, to raise and surface the track out-of-face, and to assist the section gangs when necessary. Also, laborers for performing special duties in yards are also employed.

The report goes into considerable detail in describing the section and extra gangs and their duties. To illustrate the results of the system, the committee included in its report a table which makes a comparison of the labor employed in 1929 and in 1939, and also quoted figures to show that there was a 51 per cent decrease from 1929 to 1939 in the man-hours of section-men's time per equated track mile, although freight traffic density was only 22 per cent less in 1939 than in 1929. The committee also listed the advantages of the method, a disadvantage, and the conditions favoring its use. Three conclusions were presented as follows:

(1) The "flat-work" method employed in track maintenance on the Central of Georgia merits consideration on lines of medium to light traffic, with fairly uniform tie renewals and with a stable roadbed having few soft spots or other conditions requiring frequent and special attention.

(2) On such lines it reduces the amount of time lost in moving forces from place to place; permits comparisons to be made of the work done on different sections, thereby strengthening the competitive spirit among the forces.

(3) This method is not adapted to tracks where heavy traffic necessitates frequent light surfacing, where frequent attention must be given to places of chronic and recurring trouble, or where the forces are so small as to require their constant attention to one trouble spot after another.

A. A. Miller (M. P.) endorsed the conclusion of the committee relative to the "flat-work" method of carrying out maintenance work on light-traffic lines, pointing out that while he had at first looked upon the method with skepticism, he had since found it to have considerable merit as applied to lines of light traffic and questionable future need.

Combined Vs. Separate Bridge and Building Gangs

Reporting on the relative economy of combined versus separate bridge and building gangs, the committee gave the results of a questionnaire that it had distributed among the railroads to determine the prevailing practice. Of the 38 roads answering the questionnaire, 27 use combined gangs and 11 separate gangs. The committee also listed the respective economies claimed for the two types of gangs and also offered the following conclusion, which it recommended for adoption and printing in the Manual:

"The relative economy of combined or separate gangs for bridge and building work depends upon the conditions prevailing on individual railroads and, in many cases, on grand divisions or districts of a single railroad. For railroads in general, with half or more of their bridges of timber construction and with a large proportion of their buildings of frame construction, combined gangs are preferable to separate gangs. See definition for Gang—Combined, and Gang—Separate, in Glossary."

In addition, the following definitions were submitted which were also offered for adoption and printing in the Manual.

Gang—Combined.—One handling renewal and maintenance work on bridges (other than those of steel) and culverts, buildings and miscellaneous structures (other than those of considerable importance and commonly of steel, brick or stone construction) over an assigned territory, or as directed.

Gang—Separate.—One handling only bridge and culvert work and other miscellaneous heavy work as directed; or handling only building and lighter miscellaneous work; or handling only painting, both bridge and building, or either.

The conclusions and definitions recommended by the committee were adopted without discussion.

Labor Economies Through Improved Drainage Practices

Labor economies resulting from improvements in drainage practices formed the subject of a final report submitted by this committee. To determine the monetary savings in labor resulting from improvements in drainage practices, the committee mailed a questionnaire to 52 roads, of which 30 submitted replies, although only 20 of these submitted figures. Information obtained as a result of the questionnaire was presented in tabular form.

The committee also submitted information regarding the savings effected as a result of two actual drainage installations, one involving a tile drain-pipe system in a cut on the St. Louis Southwestern, and the other an installation of perforated corrugated metal pipe in a fill on the Illinois Central. The following conclusion was submitted:

The study made by this subcommittee substantiates the conclusions reached by previous committees of this Association, that (a) adequate drainage of the roadbed is essential to the economical maintenance of track, (b) that economies can be effected by the various methods reported on herewith, and (c) that the particular type of installation best adapted to any location varies with the local conditions existing at the specific point.

Use of Off-Track Maintenance Equipment

In a final report on the added labor economies resulting from the use of off-track maintenance equipment, the committee listed five factors that have brought about the development of such equipment. It also submitted a table containing a partial list of maintenance machines, divided between on-track equipment, off-track equipment and those machines that are operated on the rails but which can be set off to clear traffic.

Discussing the economies of the different types of equipment, the committee pointed out that the unit costs of operating on-track equipment are usually higher than for off-track machines. It said further that, as these extra costs are increased, there will be a further incentive for the development and use of off-track equipment. Following a brief discussion of the effect that the development of the crawler tread has had in making it possible to remove equipment from the rails, the committee listed five different labor economies that are made possible by the use of off-track equipment.

Maintenance of Way Work Equipment

G. R. Westcott, Chairman*

This committee presented progress reports on two of its assignments and final reports, submitted as information, on five others. No report was presented under Revision of Manual, but the committee made one recommendation regarding Manual material in one of its progress reports.

Standardization of Parts for Motor Cars

In its report on the standardization of parts and accessories for railway maintenance motor cars, the committee offered two designs for a receptacle to be mounted on motor cars for the purpose of carrying fuses and torpedoes. Both designs, which were illustrated mainly by means of photographs, incorporate provisions for carrying a first-aid kit in the same container. No recommendation was made regarding the desirability of carrying first-aid kits in the containers, nor as to the number of flags, fuses and torpedoes to be carried, as these matters depend on the rules in effect on individual railroads. For this reason no dimensions were shown.

Pointing out that a recommended design for a safety rail for section motor cars is now shown in the Manual, the committee submitted this year a design for a safety rail to be used on light inspection motor cars, recommending that it be adopted for

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publication in the Manual. This recommendation was approved without discussion.

Applying Metal Preservatives to Rail

The committee's report on devices for applying metal preservatives to rails and fastenings consisted of descriptions of the various methods and appliances that are in use for this purpose and their application. First, the committee listed the causes of corrosion in rail and fastenings and pointed out that it is prevented or controlled by the simple expedient of placing a protective coating, commonly consisting of an asphalt base oil, on the surface of the metal. The devices that are in use for applying oil to rail were divided into two classifications, namely, (1) hand-operated appliances, and (2) power-operated sprayers, and were described under these separate headings.

In discussing hand operations, the committee sub-divided this classification into three groups as follows: (a) Brushing or painting; (b) hand-operated one-man sprayers, and (c) application of joint packing. The devices and methods employed under each of these sub-divisions were described briefly. Stating that, for extensive oiling programs, power-operated sprayers are advisable, the committee divided the equipment that is employed for this purpose into three general classifications as follows: (a) Small power sprayers handled by motor cars; (b) gasoline-powered self-propelled units; and (c) large spray cars handled by work trains. Under (a) the committee described a unit, about the size of a push car and incorporating an engine-driven centrifugal pump for applying the preservative, that is in use on one road. Under (b) a patented oiler of rather large capacity was described. This particular unit consists of two parts, the oiler and a trailer tank car, and will oil the rails and fastenings at a rate of 15 to 20 miles an hour.

Turning to the type of equipment included under (c), the committee presented a general description of the mechanical features and the method of operation of units of this type. It stated that several roads have used such equipment successfully and that, although work-train service is required, the cost of the work is often less than \$3 a mile. This method, the committee said, has the further advantage that the oil is applied hot and therefore penetrates the rust and seals better than cold oil. Also included in the report was a brief discussion of the use of tie-tamping compressors, equipped with hose and spray nozzles, for spraying the rails and fastenings at certain locations. This material was submitted as a final report.

Keeping Data on Work Equipment

In submitting a final report on methods of keeping data on work equipment, the committee listed eight reasons why it is highly desirable to keep records relative to the ownership, operation and maintenance of such equipment. It asserted that, although studies have clearly indicated that it is not practicable to establish standardized methods of keeping such data, the standardization of forms for this purpose is considered both practical and desirable. The committee reported that it had, therefore, designed forms for collecting and recording work equipment data, which represent a cross-section of the forms in use on various roads.

These forms, which were reproduced with illustrative data in the report, were divided into two broad classifications, namely, (1) ownership, location and condition; and (2) cost of operating and maintaining work equipment. There are eight forms under the first classification, which are identified as follows: Report of inspection of new work equipment; record of work equipment; report of transfers of work equipment; report of failure of work equipment; work equipment inspection report; report of location of work equipment; report of work equipment used for A. F. E. work; and recommendations for retirement of work equipment.

Under the second classification, the committee submitted five forms as follows: Daily report of operation of work equipment; monthly report of operation of work equipment; report of field repairs to work equipment; report of shop repairs to work equipment; and service record.

Pneumatic-Tired Tractor Equipment

Pneumatic-tired tractor equipment was the subject of a brief progress report. Pointing out that the railroads are making use of such equipment to a lesser extent than farmers, contractors and highway departments, the committee explained that

this was attributable to the fact that equipment of a character suitable for railroad service has not been made available. Giving the reasons behind the trend toward such equipment, the committee cited the increased mileage of paved highways that is available for the transportation of equipment, it being possible to operate pneumatic-tired units over such highways at considerable speeds and with a minimum of damage to the highways and equipment. When moving railroad equipment over highways, delays in loading and unloading and to trains are eliminated. Other reasons for the trend toward pneumatic-tired equipment as given by the committee, include the lower cost and better quality of the pneumatic tires now available, and the lower first cost, lighter weight and portability of the equipment.

Units of pneumatic-tired equipment, not classed as tractors, that are being used by the railroads because they are portable and easier to handle, include rail grinders, compressors, generators, welding outfits, wheel scrapers, lawn mowers, wheelbarrows, and the various types of material-handling equipment used around store rooms, freight houses, etc. It is the opinion of the committee that co-operation between the railroads and the manufacturers in developing units of pneumatic-tired equipment suitable for railroad service will largely increase the use of such equipment. This report was illustrated by photographs of various types of pneumatic-tired equipment.

Impact Wrenches

In a brief final report on impact wrenches, the committee described the salient features of the two wrenches of this type that are now on the market, one of which utilizes an air-motor operated cam to deliver the impacts, while in the other type the impactive effort is built up by a pair of fly weights operated by a slow-speed rotor motor. The various sizes of the wrenches that are available for railroad service were then described, after which the committee listed the different operations in railroad service for which the wrenches are being used. It said that the low recoil of the wrenches reduces scaffold requirements and makes possible their use with safety in overhead or arms-length operations. However, it cautioned that care must be exercised to avoid overstressing. Cross-sectional drawings of the two types of impact wrenches were included in the report.

Arc Welding Equipment

The report of the committee on arc-welding equipment, which was final, was confined to descriptions, illustrated by photographs, of the different types of mountings that are in use on equipment employed in maintenance work. Mention was made of track-mounted machines involving several different arrangements for removing the units from the track. Other types of equipment that were described and illustrated included a highway-truck mounting with a power-take-off from the track engine, a four-wheel mounting on pneumatic tires, a pneumatic-tired unit mounted on a track-mounted under-slung push car, and crawler-mounted self-propelled units. In its conclusion, the committee stated that "it is contended by many that the use to which welding is put in maintenance work depends on the mobility of the equipment associated with it. To this end, the mountings described have been designed for a broad field of application.

Off-Track Grading Equipment

In a final report on off-track grading equipment, the committee described the various units of equipment of this type that are now in service and cited their application and advantages in railroad work. The committee stated that the present tendency of railroads to replace expensive on-track equipment with the latest off-track machines indicates that great advantages are being found in the use of such equipment. First the committee dealt with that classification of equipment that includes bulldozers, angledozers, bullgraders, and trailbuilders. "It is the consensus," the committee said, "that machines of this type are invaluable in railroad work, and the savings effected through their use have, in many cases, paid for the original investment during the first few months they were used."

Turning to crawler-mounted front-end loaders, the committee said that these machines have proved very successful in ditching cuts of moderate length, and have been used with a large measure of success in restoring embankments, widening banks, surface ditching, building roads, grading, loading trucks, lining tracks, cleaning up coal storage piles, plowing and loading snow, and cleaning under bridges. Regarding carryalls, the committee

said that so few are in use on railroads that very little information is available regarding them. However, it described the sizes of these machines that are available, the different types and the advantages and applications of each. Similar information was also given regarding shovels and draglines. Two instances were described in which crawler-mounted grading equipment was used to good advantage, after which the following conclusion was offered:

The use of off-track grading equipment will expedite work, minimize traffic delays, perform work that it is impossible to do with on-track equipment, and effect gratifying returns on investment costs.

The entire report of this committee was received without discussion.

Roadway and Ballast

A. E. Botts, Chairman*

This committee submitted reports on one or more parts of eight of its eleven assignments, with a number of which it offered recommendations regarding Manual material.

Physical Properties of Earth Materials

One of the assignments of this committee is to report on the structural bearing power of soils, this being part of its general assignment relating to the physical properties of earth materials. The report of the committee on this subject consisted of a general discussion of settlement and bearing capacity of structural foundation soils. Under settlement, the committee discussed the different types of soils and their performance under load. It described a procedure for use in determining the amount of settlement to be expected in different soils. Other matters that were given consideration as influencing settlement included deformation due to lateral flow, the manner in which the load is applied, and the moisture content.

Under bearing capacity, the committee presented a general discussion of the factors to be taken into consideration in determining the load capacities of different soils. Discussing the bearing capacity of piles, the committee gave consideration to the relation between dynamic resistance and static bearing capacity in different types of soils. It also discussed the effect on bearing power of the consolidation of soils or of increasing their compressibility by remolding. This report was offered as information.

Natural Waterways

Under natural waterways the committee has two assignments, one of which is to report on formulas for determining the size of waterway openings. Last year the committee presented as information a discussion of the principles involved in determining the run-off from drainage areas and in arriving at the required size of waterway openings. This material was presented again this year with the recommendation that it be adopted for inclusion in the Manual. This recommendation was approved.

Culverts

The committee has two assignments relating to culverts, one of which is to develop specifications for vitrified clay pipe culverts, and the other of which is to compile specifications for pipe line crossings for carrying non-inflammable substances under pressure. Reports were presented this year on both these assignments. Regarding the first assignment, the committee stated that it had presented as information last year a specification for vitrified clay culvert pipe which was adapted from an A. S. T. M. specification. It reported that no criticisms of the specification have been received and it has the approval of Committee C-4 on Clay Pipe of the A. S. T. M. This specification, embodying a few corrections, was presented again this year with the recommendation that it be adopted and published in the Manual. However, because of a number of ambiguities which were found in the material this recommendation was withdrawn by the committee.

Regarding its second assignment under culverts, the committee called attention to the fact that specifications for pipe line crossings under railway tracks were adopted in 1933, but said that,

being inclusive specifications for pipe lines carrying all substances, they have proved too rigorous for pipe lines carrying non-inflammable substances. Hence, it became desirable to develop specifications for pipe line crossings carrying non-inflammable substances under pressure. A set of such specifications was presented this year as information with the thought that they will be submitted at the 1942 convention for inclusion in the Manual. In this year's report the committee also recommended a number of changes which were considered necessary in the existing specifications for pipe line crossings before the new specifications can be adopted. These changes were approved.

Formation of Roadway

The committee submitted reports on both of its assignments under formation of roadway, one of which pertains to shrinkage and subsidence, while the other relates to the placing of material in embankments. Under the first assignment the committee recommended that the material now appearing in the Manual under "Shrinkage and Subsidence" be withdrawn, and that it be replaced by new material under the heading "Settlement of Embankments." In the new material, shrinkage and subsidence are dealt with under separate headings and the material under the latter heading consists of the conclusions that were submitted as information with the report that the committee presented at the 1940 convention. This material was approved.

Regarding its assignment relating to the placing of material in embankments, the committee submitted a detailed discussion of the subject. First it reviewed present highway practice in this regard and then discussed the applicability of these highway methods to the construction of railroad embankments, giving due consideration to the matter of costs. This portion of the report also gave consideration to the compacting effect of grading equipment and described the factors to be considered in securing adequate compaction. The committee also proposed certain revisions in the grading specifications to make provision for sprinkling or rolling, or both, in cases where such treatment is desirable. These revisions were adopted.

Lighting of Tunnels

Supplementing the report which was presented at the 1940 convention on the lighting of tunnels, the committee submitted this year a further brief discussion of its findings. Also included in this year's report was a paragraph dealing with the use of portable power plants for lighting tunnels, which the committee recommended for adoption and inclusion in the Manual. This paragraph was accepted.

Fences

Under fences, the committee has three assignments, one of which relates to corrosion-resisting fence wire, another to wood fence posts and the third to electrified fences. Under the first assignment the committee stated that it is collaborating with Committee A-5 on Corrosion of Iron and Steel of the A. S. T. M. on the exposure tests that it is making of different types of wire. It pointed out that the first report on these tests was published in the A. S. T. M. proceedings for 1939, and cited briefly certain trends which were indicated in that report.

Regarding its assignment to develop specifications for wood fence posts, the committee stated that, after a thorough study of the subject, it had developed a specification, which was offered as information with the thought that it will be submitted at the 1942 convention for inclusion in the Manual. The material in the specification was grouped under eight headings, namely, material, physical requirements, design, manufacturer, inspection, workmanship, delivery and preservative treatment.

In reporting on electrified fences, the committee presented a general description of modern fences of this type and described their power characteristics and requirements. It also noted that there are three codes or sets of rules pertaining to the construction and operation of electric fences and presented a number of quotations from one of these codes. The committee expressed the opinion that the electric fence is not suitable for general use as right-of-way fence.

Design of Signs

For the purpose of developing information regarding current practices in the design of signs, the committee submitted a questionnaire to 28 representative railroads. The information received in returns to the questionnaire was presented in the form of a

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tabulation. This information shows the materials of construction that are employed and the dimensions of the various types of signs that are used on the railroads answering the questionnaire. The committee expressed the opinion that, in view of the great diversity of signs now in use as disclosed by the tabulation, the development of recommended designs of signs is not practicable. It also expressed the view that individual railroads should give consideration to the economies to be effected by a reduction in a number of different shapes of signs in use.

Ballast Section Design

In reporting on its assignment pertaining to the design of ballast sections, the committee offered for adoption and inclusion in the Manual two ballast section plans for curves with superelevation in excess of three inches. These sections are designated as ballast sections No. 3a—Curves, and No. 4a—Curves, and are for use with prepared gravel having less than 20 per cent of crushed particles, and with pit run gravel. They were adopted without discussion.

Use of Asphalt in Ballast

Regarding its assignment to investigate the use of asphalt in ballast, the committee noted that the test track at Bryan, Ohio, embodying stone ballast coated with emulsified asphalt, was described in detail in its previous report. This year's report was devoted to a brief discussion of certain maintenance work that had been carried out on the test track.

In presenting this report J. M. Podmore (N. Y. C.), chairman of the sub-committee, stated that no heaving had occurred in the test track during the two winters that it had been in service, although considerable heaving had occurred in the adjacent track at both ends of the test section.

Adherence to Stone Ballast Specifications

For the purpose of obtaining information on the extent to which the stone ballast specifications are being used, the committee submitted a questionnaire to the several maintenance officers of the principal railroads. This questionnaire and a summary of the replies received were included in the report. The committee also submitted a new table of gradation which it recommended for adoption and inclusion in the Manual to replace the present table in the specifications for ballast. This table was adopted.

Report on Track

W. G. Arn, Chairman*

Reports were presented by this committee on 11 of its 13 assignments, of which 8 were progress reports and 3 were final. Recommendations regarding Manual material were made in six reports, including that on Revision of Manual.

Revision of Manual

A number of recommendations regarding Manual material were made by the committee under Revision of Manual. Among these were several recommended changes that were made for the purpose of stating more clearly that payments for tie plates are made on the basis of actual weight, whether under or over, but that not more than 3 per cent overweight will be paid for. The committee also offered a new design for cut track spikes for substitution in place of the present drawing in the Manual. The committee explained that the new design is such as to overcome manufacturing difficulties encountered with the present design.

In addition, the committee recommended certain changes in, and additions to, the material now in the Manual relating to speeds of trains through turnouts. It said that these changes are considered desirable because the A. R. E. A. track plans now include both straight and curved switches as recommended practice and a speed table for curved switches should be added. The committee also recommended the deletion of the material now appearing in the Manual under the heading "Proper Methods of Tamping" and the substitution, therefore, of new material under the heading "Tamping." This change, it explained, is for the purpose of setting up recommended practices that

conform with modern methods. All of the committee's recommendations under Revision of Manual were approved without comment.

Fastenings for Continuous Welded Rail

Reporting on its assignment pertaining to fastenings for continuous welded rail, the committee submitted supplemental service reports that had been received from the Delaware & Hudson, the Bessemer & Lake Erie, and the Central of Georgia regarding the installations of continuous welded rail on these roads. Also included was a description of a test installation of continuous welded rail that has been made on the Great Northern.

Pointing out that it had been asked to submit a recommended design of screw spike for use in securing tie plates to the ties independently of the rail fastening, the committee offered as information designs for two such screw spikes. There was also included a tabulation showing the results of a questionnaire that the committee had distributed among the manufacturers to obtain information regarding the new designs from a manufacturing standpoint.

Plans and Specifications for Track Tools

Under its assignment pertaining to plans and specifications for track tools and recommended limits of wear, the committee offered two new plans, one for tie tongs and the other for a track level, which it recommended for adoption and publication in the Manual in place of the present plans. The committee also noted that last year it had submitted as information a plan for a wood-connected track gage. This plan, incorporating certain changes, was again submitted this year with a recommendation that it be adopted for publication in the Manual. All of these plans were adopted without discussion.

In addition, the committee also submitted a progress report on its assignment to recommend limits of wear of track tools for reclamation purposes. In this connection, the committee said that it assumed that a definite recommendation was desired for each particular tool, which would indicate the minimum limits for reclaimed tools. Accordingly, it submitted a list of tools, together with drawings of each of them, showing recommended minimum outlines to be adhered to when reclaiming the tools.

Plans for Switches, Frogs and Crossings

Regarding its assignment to prepare plans for switches, frogs and crossings, the committee continued its work during the year of reviewing all of the trackwork plans and specifications which have been approved by the association as recommended practice. Following the acceptance by the association of the key plans that were presented last year, work has progressed on the remaining plans of the various series in line with the details accepted in the approved key plans. The latter plans have been published in various bulletins during the past year. To serve as a temporary index, this year's report includes a list of all of the old plans as well as the re-issued plans. Also included in the list were the plans that the committee developed during the last year, which were offered for adoption as recommended practice for publication in the Manual. These plans were approved.

Corrosion of Rails and Fastenings in Tunnels

The committee continued its study during the year of methods for controlling the corrosion of rails and fastenings in tunnels. This year's study embraced an investigation of various commercial alloys, zinc spray, galvanized products and other resistant coatings. The findings of the committee were embodied in five conclusions which were presented with the report.

Supplementing the written report on this subject, A. E. Perlman (D. & R. G. W.), chairman of the sub-committee, described a series of tests that were conducted in the Moffat tunnel to determine the effectiveness of various measures for inhibiting corrosion. He stated that approximately 1,000 test pieces were observed, and that the corrosion problem was found to be present in aggravated form at points when metal touches metal. He expressed the opinion that the only effective way of overcoming corrosion in tunnels is to employ electric or Diesel power, although the latter is not totally effective.

C. H. Blackman (L. & N.) inquired if the committee had given consideration to the effectiveness of adequate ventilation as a means of overcoming corrosion in tunnels. In reply, Mr. Perlman stated that a new fan had recently been installed in the

* Assistant Engineer, Illinois Central.

Moffat tunnel, which removes locomotive gases twice as fast as formerly, but added that, while it may prove of some benefit, it will not solve the problem.

Reflex Units for Switch Lamps and Targets

Reporting on the practicability of using reflex units for switch lamps and targets, the committee first presented figures showing that the use of reflex units is increasing rapidly, and then called attention to the fact that there are laws in some states which might prohibit the use of reflex units for this purpose. These states were listed and in each case a brief interpretation was given of the statutes in question. They included Arkansas, Indiana, Kansas, Massachusetts, Michigan, Missouri, Nebraska and South Dakota.

Bolt Tension Necessary for Proper Support of Joints

In regard to its assignment to determine the bolt tension necessary for the proper support of rail joints, the committee submitted a progress report on the test installations that it has under observation on the Chicago, Milwaukee, St. Paul & Pacific, the Chicago, Burlington & Quincy, the Denver & Rio Grande Western, the Erie and the Pennsylvania. In each case the committee described the test installation briefly and presented data showing the loss of bolt tension at each joint during given periods. Also included in the report was information regarding each installation showing the amount of joint bar wear that had occurred.

In a brief discussion of this report, G. R. Westcott (M. P.) raised the question as to whether a study had been made regarding the extent to which finger-free nuts were being used, adding that a number of roads are using such nuts with success. C. M. Magee (A. A. R.) replied that the tests on the Pennsylvania were conducted with finger-free nuts and that a higher degree of uniformity in bolt tension was obtained.

Lubrication of Rail on Curves

Reporting on lubrication of rail on curves, the committee first referred to the two previous reports that it had presented on this subject and then submitted data showing the savings in engine-tire wear that were effected on one road following the installation of track lubricators. It also submitted information obtained from another road showing the savings that were effected following the installation of lubricators on a mountain division containing a large amount of curvature.

The committee stated that the present report, together with those presented previously, furnish all the information necessary to determine the economy of lubricators, and while additional information would be helpful, it is felt that the conclusions presented in one of the earlier reports are thoroughly established. It recommended, therefore, that these conclusions be approved for publication in the Manual. They are as follows:

The life of rail on curves can be extended by lubrication of the rail.

Lubrication of rail on curves can be accomplished by the following methods (in order of preference).

- (a) Mechanical lubricators installed in track
- (b) Mechanical flange lubricators on locomotives
- (c) Mechanical lubricators on locomotives applying lubricant direct to rail
- (d) Manual lubrication of rail

In addition to increasing the life of rail on curves, lubrication accomplishes the following:

- (a) Decreased cost of engine tires
- (b) Longer service life of ties because of decreased gaging
- (c) Decreased train resistance, permitting either increased tonnage, better time or less coal consumption.

The economic justification for lubrication depends upon the estimated annual saving resulting, as compared with the total estimated annual cost of lubrication.

The kind of lubricant most satisfactory in mechanical track lubricators is a grease or oil of heavy consistency.

These conclusions were adopted.

Prevention of Damage Due to Brine Drippings

The committee's report this year on the prevention of damage due to brine drippings on tracks and structures consisted principally of a discussion of a number of tests that were conducted

on the Atchison, Topeka & Santa Fe. These tests were made for the following purposes: (1) To determine whether the addition of a corrosion inhibitor to the salt used in refrigerator cars has any effect on the temperature of the brine; (2) to collect brine drippings at intervals from an empty car, iced and salted with salt containing inhibitor, and left standing at the ice dock; and (3) to collect samples of brine drippings at intervals on a regular service run from a refrigerator car iced and salted with salt containing inhibitor. In each case the procedure followed in making the test was outlined in detail and any special equipment used was described. The results of each test were also given.

Specifications for Laying Rails

With certain minor revisions, the tentative specifications for laying rail that were submitted by this committee last year as information were again presented this year with the recommendation that they be adopted and published in the Manual. Included in the specifications was a list of the several classes of rail, embodying recommendations regarding the type of track that the different classes of rail are suitable for. Operations covered in the specifications include unloading, preparation of track, laying of rails, and completing the work. These specifications were adopted without discussion.

Spirals for High-Speed Operation

During the year the committee continued its study of spirals for high-speed operation. This year it submitted new material on staking spirals by offsets, which it recommended for adoption and inclusion in the Manual in place of the existing material on this subject. This material was adopted without discussion.

Report of Committee on Rail

W. H. Penfield, Chairman*

This committee submitted progress reports on 8 of its 9 assignments, all of which were presented as information excepting a report on Revision of Manual, which contained recommendations regarding Manual material. Regarding its assignment to engage in further research of rail manufacture and to develop specifications for the thermal treatment of rail, the committee referred to the seventh progress report of the joint investigation of fissures in railroad rails, which is being conducted under the joint auspices of the A. R. E. A., through the Committee on Rail, and the manufacturers, through the Manufacturers' Technical Committee. This progress report, which was prepared by Professor H. F. Moore, who is in charge of the investigation, is summarized below.

Revision of Manual

The committee reported that it had found it desirable to revise Form 402-C (Yearly Summary of Rail Failures) in order to separate the compound from the transverse fissures and to eliminate the columns showing carbon content and rail failure rate at the end of the form. A number of corrections were also made in the instructions for filling in Form 402-C, the principal purpose of which was to bring it up to date. The committee said that it had also found it desirable to revise Form 402-E (Statement of Transverse Fissure Failures) for the purpose of simplifying the work of compiling and reporting the information required for this form. Minor revisions were also made in the instructions for filling in Form 402-E. The revised forms and instructions were submitted with the report with the recommendation that they be adopted for printing in the Manual in place of the present material.

These revisions were approved.

Rail Failure Statistics

In line with customary practice, a report on rail failure statistics for the year ended December 31, 1939, was presented by W. C. Barnes, engineer of tests of the committee. The statistics included in this report were compiled in accordance with the standard method of basing the failure rates on mile-years of service in track. Included in the report were the usual analyses of rail failures by mills, and a number of charts and tables show-

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ing the trend of failure rates. An interesting fact brought out by these figures is that the 1934 rollings of rail, whose period of observation is now concluded, showed an average rate of 35.8 failures per 100 track miles for the five-year period, which is a decrease of 37.7 failures as compared with the rate reported last year for the 1933 rollings.

Transverse Fissure Statistics

A statistical report on transverse fissure failures was also presented by Mr. Barnes, which contained figures that constitute cumulative records of the transverse-fissure failures that have been reported up to and including December 31, 1939. These statistics are presented in the form of a table showing transverse-fissure failures on various railroads by years, a chart showing the yearly trend of fissure failures, a table giving the accumulated fissure failures reported to December 31, 1939, by years rolled and by mills, and charts showing failure rates by mills.

The figures presented in the report show that 5,765 service failures and 13,823 detected failures occurred in 1939, as compared with 5,588 service failures and 12,425 detected failures reported in 1938. The total of 19,588 failures reported for 1939 represents an increase of 1,575 as compared with 1938. Mr. Barnes pointed out that, despite the large number of fissured rails detected and removed from track before they could fail in service, the number of service failures in 1939 was as great as it was in 1929, when detection methods were first introduced.

Controlled-Cooled and Brunorized Rail

Statistics were also presented by Mr. Barnes to show the tonnage of controlled-cooled and Brunorized rail that has been purchased by various railroads and the number of failures that have occurred in such rails. Included in this report was a table listing the tonnages of such rail that had been purchased by railroads represented on the Committee on Rail up to June 30, 1940. This table shows that the total tonnage purchased by these roads was 3,146,079, of which 3,022,206 tons was controlled-cooled rail and 123,873 tons was Brunorized. This represents an increase of 916,160 tons of controlled-cooled rail and 30,244 tons of Brunorized rail over the tonnages purchased up to June 30, 1939.

The figures on failures show that only a very few transverse and compound fissure failures have occurred in controlled-cooled rails, and Mr. Barnes pointed out that in all cases investigation has shown that these failures developed from inclusions and not from shatter cracks. While noting that a number of fissures have developed in Brunorized rails which were rolled prior to the change made in that process in October, 1936, Mr. Barnes pointed out that no fissures have occurred in rail treated by this method since the procedure was revised.

Cause and Prevention of Rail Battering

The committee pointed out that it is continuing to co-operate in the rails investigation at the University of Illinois in studying the prevention of rail-end batter by suitable heat treatment. In this connection it reviewed briefly the status of the field test of heat-treated rail ends that is being carried out on the Chesapeake & Ohio near Carey, Ohio.

The committee said that it has initiated a study of the art of building up rail ends by various methods of welding. It stated that replies to a questionnaire on this subject that was submitted to members of the committee have indicated a great diversity in the unit costs and other characteristics of the various methods employed. For this reason, stated the committee, it seems desirable to make a comparative field test where the methods of doing the work can be carefully supervised, the actual costs of material and labor recorded, the lengths and depths of added material measured, and the kinds of welding rods and other data recorded in such a manner as to permit the relative merits of the methods employed to be compared. The committee expects to install a test of this nature about May 1, 1941.

Economic Value of Different Sizes of Rail

Relative to its assignment to determine the economic value of different sizes of rail, the committee reported that ratios had been tentatively established by means of which the costs of different weights of rail can be compared, assuming identical road-bed conditions, traffic density and maintenance standards. The costs embodied in the ratios include interest on investment, de-

preciation in first location, track laying and surfacing, effect on life of ties and effect on coal consumption. The ratios have been expressed in terms of the 152-lb. section of the Pennsylvania and have been plotted in graph form. If costs are known for the foregoing items for any size of rail, the committee said that by means of this graph the approximate cost for any other size of rail can be determined by proportion.

During the last year the committee has made studies to determine the accuracy of the ratios both by comparison with actual performance, using data developed for a test section on the Kansas City Southern, and by comparison with figures presented by the late Robert Faries in testimony before a Congressional committee studying maintenance of way labor under the Fair Labor Standards Act of 1938. These comparisons were illustrated in the report by means of tabulations. In addition, information obtained by means of a questionnaire distributed among the committee members was plotted and found to produce curves approximately parallel with those shown in the proposed plan.

Continuous Welding of Rail

The committee stated that its activities in regard to its assignment to investigate the continuous welding of rail are at present devoted to the development of service records to supplement the findings of laboratory tests, which have been presented in previous reports. To obtain information regarding such records the committee distributed a questionnaire, results of which were presented with the report in the form of tabulations. These tabulations contained detailed information regarding the different installations of continuous welded rail, the data for the various types of welds being grouped separately. Information regarding failures was given in a separate tabulation. Another table contained a summary of the information given in the other tabulations. Supplementing the tabular information, the committee presented reports from two chief engineers regarding installations of continuous rail on their lines, and a report from a manufacturer containing an explanation of a number of failures that have occurred in welds made by this company.

Supplemental to the published report, Prof. H. F. Moore (University of Illinois) stated that investigation has shown that the later flash welds have a higher value than that of the original rail, and that the Thermit welds have a value of 90 per cent of that of the original rail.

Service Tests of Joint Bars

The committee continued its observations during the year of the service tests of various types of joint bars that were installed in 1937 on the Atchison, Topeka & Santa Fe west of Streator, Ill., and on the Pennsylvania east of Valparaiso, Ind. Periodic observations of these rail joints are made by members of the staff of the Committee on Stresses in Railroad Track. The committee reported that the principal observational tests of these joints that were made in 1940 included measurements of the rail-service profile, joint camber, bolt tension, rail gap, and out-to-out distances of bars. The report of the committee was devoted principally to a detailed discussion of the results of these different measurements.

Investigation of Joint-Bar Failures

In reporting on its assignment to investigate joint-bar failures and give consideration to the revision of designs and specifications, the committee first reviewed briefly the report on this subject that it presented last year. It then reported that during the last year it had obtained data, through observations of tests and examination of joint-bar failures, on some of the theories as to the causes of failure and possible measures of relief. Discussing the problem of cracks in joint bars, the committee presented photographs illustrating the two most common types, namely, (1) fatigue cracks originating in the spike slot, and (2) fatigue cracks originating at the upper contact surface of the bar.

The report also contained descriptions of the various service and laboratory tests that the committee has under way, which include service tests on the Chicago, Burlington & Quincy; photo-elastic studies, using Bakelite models, to determine the effect of design and bolt tension, which are being conducted in the laboratory of the Denver & Rio Grande Western; fatigue tests of full-size bars by the Colorado Fuel & Iron Corporation in co-operation with the D. & R. G. W.; and observations to

determine the effect of saw swelling. In concluding its report the committee stated that the results of its investigations to date indicate the possibility of changes in the design and specifications of joint bars.

Photo-elastic Investigations of Joint Bars

Appended to the committee's report on the investigation of joint-bar failures was a monograph by W. B. Leaf, research technician, D. & R. G. W., which was devoted to a discussion of the photo-elastic tests of joint bar models that are being conducted by that road. Mr. Leaf first discussed the principles underlying the photo-elastic method of testing and then told how the results obtained are interpreted, using as an example a rectangular bar under a uniform bending movement along a portion of its length.

Much of Mr. Leaf's report was devoted to a discussion of the wedge action of the different types of bars that were tested. The tendency of the different bars to become cocked was given particular attention and the affect of cocking on the wedge action was discussed, although the influence of other factors on wedge action was also given consideration. A portion of the monograph was devoted to a discussion of the ill effects produced by cocked bars.

In conclusion, Mr. Leaf expressed the opinion that "certain types of joint-bar failures are caused by the instability of the shapes considered as wedges. A line bearing rather than a full surface bearing contact increases contact stresses due to bolt tension and may exceed the endurance limit of the material. Failures are hastened by high bolt tension and swelled rail ends. A remedy may be found in redesigning the bars to make a more stable wedge by lowering the bolt holes where possible and using reasonable bolt tensions."

The report was received without comment.

Seventh Progress Report of Rail Investigation

The seventh progress report of the joint investigation of fissures in railroad rails was also presented in connection with the report of the Committee on Rail. The body of this report was preceded by a summary, foreword and introduction, by Prof. H. F. Moore of the University of Illinois, who has been in charge of the investigation since its inception in 1931. Nine chapters made up the body of the report, each of which, written by Prof. Moore or other members of the test party, dealt with a different phase of the investigation.

As stated in the foreword this report consisted of a summary of the work on the causes and prevention of fissures, which has been carried on since the beginning of the investigation. In his introduction, which appeared as Chapter 1 of the report, Prof. Moore gave a brief history of transverse fissures and then reviewed the development of the investigation, outlining the organization by means of which it is being carried out. He also referred to previous investigations of fissures in rails, and submitted a brief discussion of the types of stresses in rails and their effect in bringing about failures.

The other eight chapters are as follows: (2) A description of a series of rolling-load tests that were made in an effort to develop fissures in rails, and a discussion of the findings obtained in a laboratory investigation of rails that had developed fissures in service; (3) a discussion of the nature and results of a series of field tests of wheel loads; (4) a review of two test installations of hot-bed cooled rails, one on the Baltimore & Ohio and the other on the Atchison, Topeka & Santa Fe; (5) a discussion of the origin and prevention of shatter cracks in rails; (6) a discussion of the chemical compositions and metallographic structure of rail steel; (7) a description of laboratory tests that were made to determine the mechanical properties of rail steel; (8) a review of available knowledge regarding non-destructive tests for shatter cracks and fissures and (9) a discussion of acceptance tests for rails.

Appended to the report and designated as Chapter 10, was a brief outline of work which the committee plans to carry out in 1941. This proposed work includes a series of bend tests which it is planned to make at the Steelton plant of the Bethlehem Steel Company, and which it is hoped will provide the basis for a specification for bend tests. It is also planned to draw up detailed specifications for the control-cooled process of treating rails.

Supplementing the presentation of the report, Prof. Moore reviewed the progress of the tests being made of unhardened rails in track on the Chesapeake & Ohio, describing briefly the method employed of measuring batter and observations as to the relative batter to date of the end-hardened rail ends as compared with those hardened by various mill and field methods. He indicated definite retardation of batter by the end-hardened rail over the unhardened rail, but said that some of the hardest of the rail ends had developed minute cracks. He referred also to the consideration that is being given to the effect of the various methods of chamfering of rail ends that were used, and speculated upon the possibility that this grinding had some bearing upon the development of the cracks observed.

Report on Buildings

L. H. Laffoley, Chairman*

Final reports were submitted by this committee on two of its six assignments, both of which were offered as information. The assignments on which the committee reported were those on the requirements and design of garage buildings for railway service and on methods of determining the protective value of paints.

Garage Buildings for Railway Service

The report of the committee on the requirements and design of garage buildings for railway service consisted of a general discussion of the location, design, construction and arrangement of such facilities. Contending that garages should be isolated from other structures in order to minimize the hazard of fire, the committee said that large bus and truck garages should be located as near as possible to the passenger, freight or express facilities in order to reduce the expense of non-productive operations between the garage and the operating terminal.

Stating that garage facilities should be of simple but substantial design, the committee described in some detail the best practice regarding the layout and arrangement and the equipment required for offices, shops and live and dead storage areas. Construction standards and materials, heating, lighting and fire protection were given similar treatment. The following conclusion was presented by the committee:

As a whole, each problem of large bus or truck garage design must be treated separately, so that all facilities will be in proper relation to each other and to the plant as a unit. In addition, the plan should be studied so that any final arrangement adopted may permit of proper expansion without materially affecting the elements of efficiency and economy embodied in the initial layout.

Protective Value of Paints

A comprehensive report was presented by the committee on its assignment to investigate methods of determining the protective value of paints. After a brief discussion of the importance of paint and the necessity of being able to determine its durability, the committee presented the results of a survey which it had conducted among 39 roads to determine the manner in which paints are being purchased and to ascertain what tests are being made to check the life of paints. Among other things, this survey showed that all except two of these roads purchase all their paints ready-mixed.

Pointing out that railroads that are committed to specification paints may lose the economies that result from paint improvement, and may also pay higher prices, the committee said that when a standardized method of testing paints has been adopted by the railroads, the trend will be away from specification paints and toward paints recommended by the manufacturers. It stated that paint tests conducted by railroads must be such as to make it possible to select from a group of paints recommended for a certain purpose, that having the greatest economic value. Three methods may be considered: (1) Long-time exposure tests; (2) chemical analysis, and (3) laboratory-accelerated weathering. Paint tests, said the committee, should be designed to determine the performance of a paint under the particular conditions to which it will be subjected in actual service.

Before discussing actual test procedures, the committee listed and described the various ways in which paint fails, which include checking, alligatoring, cracking and scaling; blistering and peeling; spotting; washing; wrinkling; bleeding over knots;

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discoloration over cedar or redwood; dirt discoloration and mildew; early loss of gloss and early chalking; and running and sagging. These various conditions were illustrated by photographs.

In discussing methods of making paint tests, the committee first gave brief attention to the physical characteristics and chemical analysis of paints, after which it presented a detailed description of the methods, procedure and equipment employed in making accelerated weathering tests. Outside exposure tests were also considered briefly. Pointing out that occasions may arise requiring that paints be subjected to special tests, the committee described a number of such tests, including those for determining the resistance of paints to sulphur gas, cinder cutting, abrasive action, acid leaching, and brine drippings.

Following a description of the equipment and personnel required for testing paints, the committee commented in some detail on the correlation of test data, in which it devoted special attention to the relationship between the accelerated weathering test and the outside exposure test. For temporary use, it may be assumed, the committee said, that 500 hours of accelerated weathering are equivalent to one year of average service. As groups of tests are conducted, this ratio can be raised or lowered in accordance with the results shown by exposure panels that have been established at various locations. It was suggested that, when buying paints, samples should be obtained from a number of manufacturers and subjected to an accelerated weathering test, the sample resisting failure the longest being selected for purchase, with due consideration for its economy.

Following a few clarifying questions from the floor, the report as a whole was received as information.

Yards and Terminals

C. H. Mottier, Chairman*

This committee submitted final reports on four of its nine assignments and progress reports on four others, all of which were offered as information. In addition, it made a number of recommendations under Revision of Manual.

Revision of Manual

The committee submitted a definition of "siding" for inclusion in the Glossary, and recommended the adoption of a new definition of passing track to replace that now in the Manual. The recommended definition of siding is as follows: "A track auxiliary to the main track for meeting or passing trains."

The existing definition of passing track is: "A track auxiliary to the main track for meeting or passing trains, limited to the distance between two adjacent telegraph stations." For insertion in lieu of this definition, the committee recommended the following: "A track auxiliary to the main track for meeting or passing trains. Same as *Siding*."

In the material in the Manual on freight terminals, the committee recommended a number of changes in the paragraphs on hump yards, classification tracks, and departure tracks. Revisions were also recommended in the specifications for the manufacture and installation of four-track, knife-edge railway track scales, for the manufacture and installation of two-section, knife-edge railway track scales, and for the manufacture and installation of motor truck, built-in, self-contained and portable scales for railway service.

All revisions were approved.

Terminal Facilities for Later Types of Equipment

At the outset of its report on the general requirements in terminal facilities for various later types of equipment, the committee explained that "later" types of equipment are considered to be the so-called streamlined passenger cars or power units that have been developed during the last decade, and that the present report deals only with the servicing of such equipment, other than power units. The committee reviewed briefly the development of streamlined equipment and pointed out the mechanical features, including air-conditioning apparatus, of such equipment, that influence the character of the servicing facilities required. It then presented brief descriptions of the facilities

ties that two western roads have provided for servicing streamlined trains. The committee offered the following conclusion:

It is the observation of your committee that one or more pit tracks are necessary for the complete inspection of streamline passenger car equipment. The number and length of the pits will depend upon individual requirements, considering the number of trains requiring terminal inspection, the length of trains, and the schedules or layover time as factors. The servicing facilities required for streamline cars are usually included in a modern coach servicing yard. If the pit track is to be used for inspection, servicing and repairs, appurtenant facilities should be provided.

Terminal Facilities for Electrical and Air Conditioning Equipment

In reporting on the terminal facilities required for servicing electrical and air-conditioning equipment in passenger cars, the committee first pointed out that such facilities must be available at coach yards and along station tracks at terminals or other stations where cars are to be serviced or held for considerable periods of time. Next it gave consideration to the factors influencing the type and location of the electrical equipment required, and then discussed briefly the considerations that determine the location of electrical outlets.

Turning to a discussion of air conditioning, the committee listed the five types of systems that are in use and presented a table showing the number of cars that have been equipped with each of them. The terminal facilities required for each of the systems were then described briefly under the separate headings. Concluding its report, the committee stated that it intends to submit definite recommendations next year for the location and spacing of outlets for both direct current and 220-volt alternating current.

Scales Used in Railway Service

At the instance of the Association of American Railroads, this committee has reviewed critically the material applying to hopper scales that appears in Grain Circular No. 1 of the A. R. A., which was issued in 1922. As the outcome of this review, the committee offered a tentative specification for the manufacture and installation of hand-operated, grain-hopper scales, which was offered as information and for discussion.

The specification contains sections on capacity, plans, working stresses and formulas, scale levers, pivots and bearings, nose irons, lever fulcrum stands, loops and connection, checks, weigh-beams and accessories, anti-friction points and plates, clearances, interchangeability, hopper and garner, foundation, installation and performance requirements. In offering this specification the committee expressed the hope that it "may be further studied and criticized, to the end that the ultimate form may be acceptable to all interested parties."

Terminal Facilities for Diesel Locomotives

In reporting on the terminal facilities required for Diesel power, the committee pointed to the increasing use of locomotives of this type and stated that, for servicing and repairing them, the railroads are using existing facilities insofar as possible, but, as these are not always adequate or suitable, it is necessary in many cases to construct new facilities. In providing such facilities, it said, the ideal situation would be to locate the fuel tanks or the fuel supply lines, the inspection pit and the sand house, in such positions relative to each other that the locomotive can be serviced with one spotting.

After a discussion of the requirements for fuel-oil facilities the committee took up the question of repairs, and noted that the facilities required for this purpose are somewhat different than those for steam locomotives. The requirements of facilities for making running and heavy repairs were described in some detail, with particular attention being devoted to the various types of equipment that are being used to remove trucks and wheels. Finally, the committee described some of the details, such as jacking pads, that should be incorporated in Diesel locomotives to facilitate repairs.

Classification Yards

The committee's report this year on classification yards was devoted to a study of the departure ends of such yards, the object being to establish certain factors of design that should receive careful consideration in the interest of securing the prompt and economical handling of cars. During the last 10 years, said the committee, there have been radical changes in

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operating practices, which have materially affected the make-up of trains and, hence, the method of handling cars in yards. Following a brief discussion of some of these changes, the committee listed a number of factors that should be investigated when the method of making up and dispatching trains from the departure end of the yard is under consideration.

By means of a questionnaire and discussions with operating men, information was obtained regarding the design and operation of representative hump classification yards, particularly regarding the method of making up and dispatching trains, and this information was presented in the report. The committee pointed out that, in considering this information, it should be kept in mind that numerous existing hump classification yards have been designed and built for a considerably larger volume of traffic than is now being handled through them, and that such yards are generally being used as built to avoid the expenditure which might be necessary to permit changes to be made in their method of operation.

Facilities Required for Washing Passenger Cars

Reporting on the terminal facilities required for the washing of passenger cars mechanically, the committee said that this method is used extensively on buses and trolley cars but that comparatively few steam railroads have installed machines for this purpose. Two roads that have done so report a substantial saving in cost compared with hand washing where there is a sufficient number of cars to be washed and where the layout is such as to facilitate the operation.

The committee described a mechanical washing plant of the type that is used for cleaning railroad passenger cars, as well as lighter passenger equipment. It pointed out that one railroad which operates such a washing machine has installed, in addition, a "scrubbing" machine for loosening the dirt, when required, in advance of washing. Also included in the report was a list of the advantages claimed for the mechanical method of washing cars, and a list of features that are considered desirable for incorporation in mechanical washing equipment.

Handling Highway Trucks On and Off Cars

This year the committee presented its first report on its assignment to investigate the terminal facilities required for the handling of highway trucks and trailers on and off railroad cars. It pointed out that the handling of highway vehicles in this manner is a new venture made by the railroads in an endeavor to recover some of the business lost to trucks, and that it shows promise of success.

The report on this subject consisted largely of descriptions of the characteristics and requirements of the equipment needed for transferring trucks and trailers to and from cars. In this discussion, consideration was given to such matters as the accessibility and appointments of the terminal, loading platforms and ramps, bridge aprons, handling and loading, blocking and fastening, emergency equipment, inspection, vehicle attachments, the working force required, lighting, communications, the volume handled, and tariff rates.

Bibliography

In line with its usual practice, the committee submitted a bibliography of published articles and papers on passenger stations and terminals; freight stations, terminals and yards; locomotive terminals and railroad shops; and rail-and-water terminals.

The report was received without comment.

Records and Accounts

C. A. Knowles, Chairman*

Reports were submitted by this committee on eight of its nine assignments, all of which were progress reports offered as information. However, two of the reports contained recommendations regarding Manual material.

Revision of Manual

Under Revision of Manual, the committee reported that its work during the year had consisted of reviewing all forms in the

Manual to determine those in need of revision, and those that should be deleted. However, no changes were recommended at this time. During the current year, the committee plans to look into the possibility of a new arrangement of the material in Chapter 11 of the Manual, with the objective of placing it in a more logical sequence, giving a better numbering to the forms, plates and pages and simplifying future revisions.

Bibliography

The committee followed its usual practice of submitting a bibliography of books and pamphlets containing information pertaining to railroad records and accounts. This year's compilation contained references to material published during the period from November 1, 1939, to November 1, 1940.

Office and Drafting-Room Practices

Under its assignment to report on office and drafting-room practices, the committee submitted reports on three subjects, namely, (a) drafting equipment and tools, (b) specifications of materials to be used for drawings and drafting, and (c) standard system for filing drawings. Information on the practices of different roads regarding these subjects was obtained through the medium of a questionnaire which was submitted to 58 Class I railroads. Regarding the subject of drafting equipment and tools, the committee said that, after reviewing the report on this subject that was presented last year, it concluded that the matter was covered adequately in that report.

Turning to the second assignment—specifications of materials to be used for drawings and drafting—the committee discussed the subject from various angles and concluded, among other things, that "it is considered unnecessary and impractical to attempt the preparation of definite specifications at this time for the ordering of drawing materials." This part of the committee's report included a table listing the more commonly used drawing materials and giving the special factors to be considered when ordering them.

The committee's report on its third subject—standard systems for filing drawings—consisted of a comprehensive discussion of the subject under three general headings, namely, numbering and coding, indexing, and filing equipment. The committee concluded as follows: "It cannot be said that one method is always better than another because that which is best suited to the individual needs of one office might not be so well adapted to another. Each system has its special features and advantages."

The committee also recommended the publication in the Manual of a statement recommending the use of the welding symbols of the American Welding Society. It was further recommended that the report entitled "Style To Be Used in the Preparation of Reports and Specifications" that was published as information in the Proceedings for 1938, be published in the Manual.

The recommendations relative to welding symbols were approved. The committee withdrew its recommendation concerning "Style To Be Used in the Preparation of Reports and Specifications."

Maintenance Accounts and Statistical Requirements

Reporting briefly on its assignment to establish recommended practices to be followed with respect to maintenance of way accounts and statistical requirements, the committee said that it has had under study a system of recording the physical characteristics and locations of certain types of electrical equipment. It now has under consideration the enlarging of the assignment to embrace other kinds of physical property to be covered by a uniform system of recording.

Regulatory Bodies and Courts

The report of the committee on its assignment to present a resumé of developments in connection with regulatory bodies and the courts consisted mainly of a discussion of recent developments and activities regarding railway valuation, including cost data. The committee also reported that during the year the Bureau of Valuation of the Interstate Commerce Commission completed and issued its final valuations on pipe line carriers inventoried as of December 31, 1934, which was the original valuation date.

I. C. C. Valuation Orders, Reports and Records

The committee reported that a further study had been made of the subject, Forms for a Record of Ballast Changes, and

* Valuation Engineer, Chesapeake & Ohio.

that, with the aid of suggestions and forms submitted by members of the committee, a general form has been developed, modifications of which have proved satisfactory in service. This form, designated as Record of Ballast Changes, was submitted as an exhibit with the committee report, and it was recommended that it be approved for publication in the Manual.

The committee also reported that it had given continued study and consideration during the year to its assignments to study Valuation Order No. 3 reports and records to determine if further simplifications are possible, and to develop a form of Valuation Order No. 3 reports in connection with joint projects.

The form for reporting ballast changes was approved for publication in the Manual.

Revisions in I. C. C. Classifications

The report of the committee on changes in, and revisions and interpretations of, I. C. C. accounting classifications, included a tabulation of the summarized opinions of the members of the committee regarding proposed accounting rules or orders submitted by the I. C. C. Bureau of Accounts; a list of proposed orders that were in the hands of the committee for review at the time the report was prepared; a list of orders modifying accounting classifications that were issued since the committee's last report; and a list of new and revised accounting rulings that were issued in 1940.

Avoiding Duplications of Effort

Reporting on its assignment to develop methods of avoiding the duplication of reports to the I. C. C. and other public authorities, the committee reviewed its activities during the year and reported two instances in which the requirements of state commissions are being met in part by furnishing them with copies of reports that are submitted to the I. C. C. As a matter of information, the committee presented the text of the I. C. C. order dated November 15, 1940, relative to its organization schedule and the assignment of work and functions under Section 17 of the Interstate Commerce Act, as amended.

The report was received without further comment.

Special Report on Impact

J. B. Hunley, Chairman*

This committee has six assignments, all of which pertain to the development of information, through tests, regarding the nature and extent of impact stresses set up in different types of bridges or in specific parts of structures. This year's report, which was the first that the committee has submitted, consisted of a comprehensive treatise describing a series of impact tests, and analyzing the results obtained, that were conducted on two spans on the main line of the Pennsylvania at Chester, Pa.

The committee considers the measurements obtained during these tests to be "especially valuable because they afforded a comparison of impact effects produced by steam locomotives and electric locomotives without unbalanced counterweights at the drivers; because tests were conducted at speeds as high as 105 miles an hour with the electric locomotives and 90 miles an hour with the steam locomotives; and because actual stresses were measured with new type electric gages not available in earlier tests." "In addition to the information acquired," the committee continued "the analysis of these tests has been of very great value in clarifying the future test procedure that should be followed."

The information contained in the report was presented in the form of chapters or sections, there being separate sections devoted to the instruments used, the nature and size of the spans tested, the locomotives used in the tests, the locomotive characteristics affecting dynamic stresses, the general test procedure, the analysis of field records, and the nature of the impact as found from the test data. In addition, the body of the report was preceded by a brief "digest," in which the tests were described briefly and the results were summarized. The findings of the committee were embodied in a series of five conclusions that were presented at the end of the report. Accompanying the report were 51 plates and diagrams, and 38 tables of test data.

The two spans on which the tests were conducted were adjoin-

ing plate-girder spans in the same bridge, one of them being 55 ft. 10 in. in length, while the other was 122 ft. long. Four locomotives were used in the tests, including two high-speed electric engines (Classes P 5-A and GG-1), one steam passenger locomotive (Class K4-S), and one steam freight locomotive (Class M1-A). Stresses, vertical deflections, and lateral deflections were measured at the center of each span under the four different types of locomotives running at various speeds ranging from approximately 5 miles an hour, which may be considered as static loading, up to a maximum speed of 105 m.p.h. for the two types of electric locomotives, 80 m.p.h. for the steam freight locomotive, and 90 m.p.h. for the passenger steam locomotive.

The measuring instruments used in these tests were of the electrical type and consisted of 20 electro-magnetic strain gages by means of which a continuous record of the strains at various points could be obtained; two lateral deflectometers and two vertical deflectometers located at the centers of the spans for recording the lateral and vertical movements during each run; and one timer, by means of which the speeds of the locomotives were obtained. In addition, two mechanical deflectometers were used which also recorded directly the vertical movements at the centers of the spans.

"Although a great deal of interesting and valuable data was obtained as a result of these tests," the committee said, "it must be remembered that these tests represent only two spans, and, while there is evidence that certain factors are more important than had been generally realized, it is recommended that, until they can be verified by other tests, there be no revision of the impact allowances as now provided for by the A. R. E. A. design specifications or rating rules." The committee's five conclusions were as follows:

(1) With the possible exception of speed effect and lateral forces, the impact allowances, as now provided for in the section on design of the A. R. E. A. Specifications for Steel Railway Bridges, and Rules for Rating Existing Iron and Steel Bridges, are ample.

(2) In these two spans, at least, there was an increase in the vertical force due to speed. These forces are of such magnitude that they require further investigation, and, if it is found that they occur in other spans, it will be necessary to include some allowances for them. While there has been evidence of such forces in other tests, they were not so apparent, due to the fact that runs were not made at such high speeds and the instruments used were not suitable for their exact measurement.

(3) Further investigation should be made as to lateral or nosing forces. While this is not so important in the design of new structures, definite information as to their magnitude is necessary for determining the capacity of old structures. The forces as computed from the measured lateral deflections as found in these tests are somewhat greater than those provided for in the rating rules.

(4) In these tests, it was found that the track effect did not increase with the square of the speed as provided for in the rating rules, and the measured values, in all cases, were less than those called for in the design specification.

(5) The determination of impact by the measurements of stresses, when suitable instruments are used, is more satisfactory than determination by measuring deflections. This is especially true for short spans.

The report was received without comment.

Rules and Organization

W. T. Dorrance, Chairman*

Other than Revision of Manual, this committee has one assignment, namely, to prepare rules and regulations for the guidance of employees of the maintenance of way department, collaborating with appropriate standing committees. Under Revision of Manual, the committee recommended the elimination of all material heretofore adopted by the association on its recommendations, which was published in the 1929 Manual and supplements thereto, but which was withheld from the present Manual by order of the Board of Direction. For substitution in place of the deleted material, the committee offered, in accordance with its other assignment, a complete set of rules and regulations

* Engineer of Structures, New York Central System, West of Buffalo.

* Assistant to Chief Engineer, New York, New Haven & Hartford.

governing maintenance of way and structures employees. This material contained a total of 1,022 separate rules, which were grouped under six general headings, namely (1) General, (2) Roadway and Track, (3) Bridges and Buildings, Water Service and Work Equipment, (4) Signals and Interlocking, (5) Telephone and Telegraph, and (6) Electrified Territory.

All rules heretofore prepared by the committee were withdrawn from the Manual. After an extended debate the committee withdrew its recommendation that the rules it presented be adopted and offered them as information only.

Iron and Steel Structures

R. A. Van Ness, Chairman*

This committee submitted reports on two of its eight assignments, namely, on Revision of Manual, and a final report, offered as information, on non-ballast-type metal-floor bridges.

Revision of Manual

A number of recommendations were made by the committee under Revision of Manual. These included a considerable number of revisions in the specifications for steel railway bridges, which included changes in the paragraphs on stiffeners at points of bearing, preparation of holes, size of holes, reaming and drilling and fit of stiffeners. A revision in the rules for rating existing iron and steel bridges was also recommended. In addition, a set of instructions for the maintenance inspection of steel bridges was submitted, and was recommended for adoption and publication in Chapter 15 of the Manual.

Other than those revisions relative to stiffeners at points of bearing which the committee withdrew for further consideration, all the recommendations of the committee were adopted.

Non-Ballast Type Metal Floor Steel Bridges

In its report on non-ballast-type metal-floor steel bridges, the committee pointed out that bridges of this type are adapted to locations where the depth from base of rail to clearance line is small. Drawings showing five variations of this design were presented, and the report was devoted to a discussion of the different features of these variations.

Report on Masonry

J. F. Leonard, Chairman†

This committee presented reports on 11 of its 15 subjects, most of which were offered as information, although four of them contained recommendations regarding Manual material. With regard to its assignment to maintain contact with the Joint Committee on Concrete and Reinforced Concrete, the committee called attention to the fact that the joint committee's report on recommended practice for the use of concrete and reinforced concrete had been published as information in Bulletin 419, September-October, 1940, and that it would appear in the Monograph section of the Proceedings for 1941.

Revision of Manual

The committee recommended a number of minor revisions in the present specifications in the Manual for Portland cement concrete, plain and reinforced, most of which involved changes in the A. S. T. M. designations. It also recommended a number of revisions in the specifications for high-early-strength Portland cement, and proposed a new paragraph on the nature and manufacture of shotcrete, which was offered for inclusion in the specifications for shotcrete in place of an existing paragraph.

All the recommendations of the committee were adopted.

Composite Columns and Pipe Columns

In reporting on composite columns and pipe columns, the committee recommended the withdrawal of the existing material in the Manual on the design of columns and its replacement with new material embodying numerous revisions.

This recommendation was adopted.

The new tentative specifications for Portland cement of the

American Society for Testing Materials were the subject of the committee's report on its assignment to report progress in the science and art of concrete manufacture. While these specifications are only tentative and do not supersede current standards for plain and high-early-strength Portland cements, it is anticipated, the committee said, that some engineers may wish to take advantage of the wider range in types which they afford. With this thought in mind the committee described the nature and properties of each of the five types of cement, and outlined the applications for which each of them is best adapted.

Lining and Relining Tunnels

In its report on methods and practices of lining and relining tunnels, the committee submitted as information a set of specifications for lining railway tunnels with metal liner plates and shotcrete. Also, it submitted for adoption a number of revisions in the present specifications in the Manual for lining railway tunnels with plain concrete, explaining that the purpose of the revisions was to include provision for a solid floor track section with center drain, along with the present standard for a ballast section.

These recommendations were adopted.

Progress in Cement Manufacture and Testing

Reporting on its assignment to keep the association advised of current progress in the manufacture and testing of cement, the committee listed the five types of Portland cement included in the new tentative specifications of the A. S. T. M., and explained that these types correspond closely with the five federal specifications that were listed in the committee's report last year. Tables were included in this year's report showing the chemical and physical requirements of the five types.

Also, the committee outlined the findings of extensive laboratory investigations relative to the plastic mortar cube test and types of tests for determining volume change and soundness, which have been conducted during the past year under the sponsorship of working committees of Committee C1 on Cement of the A. S. T. M. The committee explained that in recent years there has been a growing realization that certain qualities of concrete, such as plasticity, prevention of bleeding, etc., have been neglected and that, accordingly, attempts have been made to effect improvements on these qualities by adding certain materials to cement during manufacture. A number of these materials were listed and commented on by the committee.

Specifications for Culvert Pipe

Under its assignment to develop specifications for culvert pipe the committee submitted as information last year a set of specifications for the placement of concrete culvert pipe. In its report for this year the committee recommended that these specifications be adopted for inclusion in the Manual.

They were adopted.

Pressure Grouting

The committee's report on pressure grouting consisted of a set of specifications for the solidification of masonry structures by pressure grouting, which were offered as information with the expectation that they will be recommended for adoption and publication in the Manual next year.

Concrete Bridges and Other Structures

Progress was reported by the committee on its assignment to develop specifications for concrete and reinforced concrete railroad bridges and other structures. A skeleton outline for the specifications has been prepared and the subject matter is being developed by comparing the present specifications, topic by topic, with those of 25 or 30 railroads and public utilities. The committee reported that in this procedure the report of the Joint Committee on Specifications for Concrete and Reinforced Concrete had proved of special value.

Specifications for Test Borings

In reporting on its assignment to develop specifications for test borings, the committee submitted as information a set of such specifications and a table giving information regarding the different methods of making underground explorations, stating that in 1942 it intends to submit both of them for publication in the Manual. Included in the committee's report was a discussion of the different methods of making test borings, including test pits,

* Bridge Engineer System, Atchison, Topeka & Santa Fe.

† Engineer Bridges and Buildings, Central Region, Pennsylvania.

augers, dry sample borings, core borings, and miscellaneous methods.

To supplement the information now in the Manual giving the physical properties of earth materials, the committee submitted as information a number of notes on the identification and classification of various soil materials. Also, pointing to the importance of making a complete record of the information obtained during test borings, the committee submitted a list of items that should be included in boring reports.

Concrete Placed Under Water

One of this committee's assignments is to develop specifications covering the placement of concrete under water. As its report on this subject, the committee submitted a set of specifications, entitled *Special Requirements for Concrete To Be Deposited Under Water*, which was recommended for adoption and publication in the Manual in place of the present specifications, which are entitled *Depositing Concrete Under Water*. The committee also recommended the renumbering of certain sections of the specifications for Portland Cement concrete.

Both of the recommendations of the committee were adopted.

Durability of Concrete

The committee's report on the durability of concrete, which was submitted as information, consisted of a comprehensive discussion of the subject based largely on information obtained in reviewing the literature that has appeared during the last ten years. The report was divided into sections or chapters, in which the committee endeavored to discuss the various major factors affecting durability from the standpoint of materials and manufacture; to outline the principal defects in concrete which lead to disintegration; to consider the most important weathering actions and other disintegrating forces affecting durability; and to discuss various tests for predicting durability.

In its conclusion, the committee stated that it "desires to warn against undue alarm at the foregoing enumeration of the many ills to which concrete may be heir under various exposure conditions. Our purpose is to widen the appreciation of concrete technology and thereby hasten the day when all concerned will give proper attention to those precautions which are necessary in securing durable concrete . . ." Included also in the conclusions was a list of the "high points" in the procedure for producing durable concrete. Appended to the report was a bibliography of the literature to which reference had been made in preparing the report.

Waterproofing of Railway Structures

J. A. Lahmer, Chairman*

This committee made a number of recommendations under Revision of Manual, and submitted a brief report on its other assignment which is to keep the association advised of developments in the waterproofing of railway structures.

Revision of Manual

The recommendations that were made by the committee under Revision of Manual called for a number of minor revisions in the specifications for membrane waterproofing. These revisions, the committee said, do not change the meaning of the specifications and are recommended for the purpose of avoiding ambiguity. These revisions were approved.

Waterproofing of Railway Structures

The committee reported that a study is being made of the specifications for woven cotton fabrics saturated with bituminous substances for use in waterproofing, A. S. T. M. designation D 173-40T, and of the specification for coal-tar pitch for roofing, dampproofing and waterproofing, A. S. T. M. designation D 450-38T, in comparison with A. R. E. A. specifications, and said it is probable that agreement will be reached after additional information is received with reference to certain requirements.

It also reported that progress has been made toward harmonizing differences between the A. S. T. M. specifications for asphalt for dampproofing and waterproofing and corresponding requirements in the A. R. E. A. specifications for membrane water-

proofing. The committee has been informed by two of the larger oil companies that they are prepared to furnish waterproofing asphalt that will meet all requirements of A. R. E. A. specifications. Further, the A. S. T. M. committee on bituminous waterproofing and roofing materials has indicated that during the coming year it will endeavor to obtain co-operation of the Federal Specifications Board, the American Association of State Highway Officials and the A. R. E. A. in an effort to adopt uniform specifications for waterproofing materials.

Wood Bridges and Trestles

H. M. Church, Chairman*

This committee submitted progress reports, offered as information, on three of its ten assignments, and a final report on another assignment, which contained material that it recommended for inclusion in the Manual. Further recommendations regarding Manual material were contained in the report under Revision of Manual.

Revision of Manual

Stating that it has reviewed American Lumber Standards—Simplified Practice Recommendations R-16-30, which had been approved by the National Bureau of Standards on October 15, 1939, the committee said that, acting in collaboration with the A. R. E. A. representative on the Central Committee on Lumber Standards, it had approved the revisions. Accordingly, the committee recommended that this material be adopted for inclusion in the Manual. Numerous revisions were also recommended in present Manual material.

All the committee's recommendations were approved without discussion.

Classification of Timber for Railway Uses

The sub-committee assigned to the task of reporting on the simplification of grading rules and classification of timber for railway uses stated that it had participated actively in the revision of the National Lumber Standards having reviewed and commented on the revisions, and that it had maintained close contact with John Foley, forester, Pennsylvania, in his capacity as the A. R. E. A. representative on the Central Committee on Lumber Standards, of which he is chairman. To bring the Manual into desired conformity with the revised American Lumber Standards, the sub-committee explained that, in collaboration with Mr. Foley, it had prepared the revisions that were recommended for adoption under Revision of Manual.

Design of Wood Bridges and Trestles

In reporting on its assignment to develop specifications for the design of wood bridges and trestles, the committee submitted a specification for the design of wood bridges and trestles for railway loading, which was offered for consideration and constructive criticism. After further study and suitable revision during the current year, it is expected that the specifications will be presented in 1942 for adoption as Manual material.

Relationships Between Hammer and Pile

Under its assignment to develop recommended relationships between the energy of hammers and the weight or mass of piles for proper pile driving, the committee offered as information a redraft of the conclusions that were presented in its report for 1940. Revisions that were made in this material applied to that portion of the report under the heading of "steam hammers," where a number of limitations were recommended to serve as a guide in the selection of pile-driving equipment.

Also included in this year's report was a series of tabulations showing the supporting capacities of piles of different weights driven by various types and sizes of steam hammers in common use. It was explained that the tables are based on the Engineering News, or Wellington, formula, modified to give consideration to the efficiency of the hammer blow for different weights of piles.

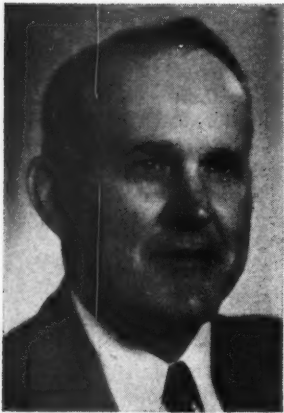
Fireproofing Wood Bridges and Trestles

Reporting on its assignment to investigate the fireproofing of wood bridges and trestles, including the placing of fire stops,

* General Supervisor Bridges and Buildings, Chesapeake & Ohio.

(Continued on page 487)

* Senior Assistant Engineer, Missouri Pacific.



R. B. Fisher
President



J. S. Hutchins
President-Elect



C. H. White
Secretary

N. R. A. A. Presents Effective Exhibit at Chicago

79 companies participate in display of latest developments in equipment and materials adapted for railway construction and maintenance

COINCIDENT with the convention of the American Railway Engineering Association during the week of March 10, the National Railway Appliances Association presented a highly interesting and successful exhibit of equipment, materials and supplies adapted for railway construction and maintenance, on March 10 to 13, with 79 manufacturers participating. This was the thirtieth exhibit that the Association has presented in connection with the meetings of A. R. E. A.; yet both the individual exhibits and the exhibition as a whole have rarely approached as high a standard for pleasing arrangement of the displays or diversity of products as were shown this year.

As in former years, the exhibit as a whole was broad in scope, with many features of special interest to those in the track, the bridge, the building and the water service departments. With prospects that maintenance activities for the year will be on a higher level than for any year since 1930, and with every indication pointing to a wider use of work equipment, the exhibit contained many features that gave maintenance officers an opportunity to familiarize themselves with the latest developments and improved designs of the products of those manufacturers who showed their materials and equipment, in a way that cannot be equalled at any other time during the year. This was the fourth consecutive year that the exhibit has been held in the International Amphitheatre, with its larger space and more modern setting for display purposes, accompanied by favorable auxiliaries in the way of meeting rooms and dining facilities.

Again, through the courtesy of the N. R. A. A., free, chartered bus service was provided during the period that the exhibit was open, between the Palmer House and the Amphitheatre, for the convenience of railway officers desiring to attend the exhibit. Approximately 750 representatives of manufacturers were on hand at

the exhibit to receive visitors and to explain the merits and operating details of their products, many of which were either new and on display for the first time or were improved in design since they were shown last year. During the period of the exhibit, it was attended by numerous executive and managing officers; many supervisory officers, particularly from Chicago and vicinity; a considerable number of officers from the purchases and stores departments; and representatives of the signal department.

The officers of the N. R. A. A. who were charged with the responsibility for arranging and conducting the exhibit this year were: President, R. B. Fisher (Buda Company), Harvey, Ill.; vice-president, J. S. Hutchins (Ramapo Ajax division, American Brake Shoe & Foundry Co.), Chicago; secretary, C. H. White (Industrial Brownhoist Corporation), Chicago; treasurer, W. J. Hanna (Republic Steel Corporation), Chicago; Directors—E. D. Cowlin (Eaton Manufacturing Company, Reliance Spring Washer division), Massillon, Ohio; T. E. Rodman (Maintenance Equipment Co.), Chicago; H. H. Talboys (Nordberg Manufacturing Company), Milwaukee, Wis.; K. I. Thompson (Ingersoll-Rand Co.), Chicago; C. D. Young (Metal & Thermit Corporation), Chicago; V. E. McCoy (National Aluminate Corporation), Chicago; C. E. Ward (United States Wind Engine & Pump Co.), Batavia, Ill.; Lem Adams (The Oxweld Railroad Service Co.), Chicago; and C. L. Mellor (Barco Manufacturing Company), Chicago.

At the annual meeting on March 11, President Fisher reviewed the operations of the association for the year and stated that not only were the finances of the association on a sound basis, but that the membership as a whole was taking a more active interest in the affairs of the association itself and in the exhibition than in previous years. He reported an increase of one in the membership, bringing the total 111 companies.

Secretary White reported that this membership included 79 exhibiting and 32 associate members. Treasurer Hanna reported that preliminary estimates indicated that the year will be closed (March 31) with a balance of \$38,500, and that it will be possible to refund approximately 20 per cent to all exhibitors, leaving a net balance for the year of \$33,000.

E. D. Cowlin, chairman of the committee on Consolidation of Exhibits, reported that the proposal to concentrate the meetings of the various railway associations within a limited period is still under consideration by

the associations involved and that progress is being made.

In the election of officers Mr. Hutchins was advanced to the presidency; Mr. Hanna was elected vice-president; Mr. Young was elected treasurer; and Mr. White was re-elected secretary. Directors—H. M. McFarlane (O. F. Jordan Company), East Chicago, Ind.; and Mr. Thompson, re-elected.

The companies participating in the exhibit, with the products on display and the representatives present, were as follows:

Exhibiting Members

Air Reduction Sales Co., New York; oxygen and acetylene gas welding and cutting apparatus and supplies, electric arc welding machine and electrodes, literature, samples of rebuilt hand tools, rebuilt switch point, fabricated offset angle bar, specimens welded pipe, flame cleaning and dehydrating; C. B. Armstrong, A. W. Brown, J. W. Creilly, C. A. Daley, J. F. Franzen, J. T. Gillespie, Jr., W. H. Handrock, H. A. Hocking, F. L. Huggins, J. W. Kennefic, W. T. Love, L. T. McDowell, D. Newland, U. F. Portel, E. F. Turner, E. J. Walters, M. Weist, D. J. Williams, R. B. Woodruff and I. B. Yates.

American Car & Foundry Co., New York; automatic electric steel-bar heater, one electrode electric heater, two electrode rivet heaters, and one electrode full automatic metal heater; W. J. Bisset, F. C. Cheston, H. C. Cheston and A. G. Wood.

American Fork & Hoe Co., Cleveland, Ohio; adzes, ditch-bank blades, shovels, spades, scoops, axes, hammers, scythes, brush hooks and weed cutters; H. C. Branhl, C. C. Connolly, George L. Dunn, S. L. Henderson, A. Milligan, J. J. Nolan, F. J. Reagan, John Skeel and R. J. Whelan.

American Hoist & Derrick Co., Minneapolis, Minn. Space 72.

Armco Railroad Sales Company, Middletown, Ohio; asbestos-bonded metal culverts, blast plates, metal retaining walls, multi-plate culverts, tunnel liner plates, spiral welded pipe, perforated pipe, smoke jackets, portable air-pressure pipe, galvanized sheets; C. H. Anderson, H. M. Arrick, R. Y. Barham, G. R. Betts, E. L. Brown, E. T. Cross, W. N. Crout, R. B. Faries, E. Harbeck, Logan T. Johnston, W. P. Lipscomb, N. A. Powell, W. B. Quail and W. O. Robertson.

Association of American Railroads; Original models of railway cars and devices; P. Dohm, Robert S. Henry and H. F. McLaury.

Aurora Railway Supply Company, Aurora, Ill.; tie nippers operating on section of track; M. Calendo, L. Claypool, L. I. Lipps, and Frank Main.

Barco Manufacturing Co., Chicago; gasoline hammers, tie tampers, new light-weight tie tamper; F. N. Bard, W. J. Behlke, B. H. Ferguson, C. O. Fenista, W. T. Jones, L. J. Lytle, J. L. McLean, C. L. Mellor, and F. B. Nugent.

Buda Co., Harvey, Ill.; earth drill, bridge jack, track jacks, rail bender, car stops, track liners, re-railers, bonding drill, track drill, inspection motor car and trailer, electric crossing gate, tool grinder, switch stand,

gages, levels, tie puller, motor-car parts; R. M. Blackburn, Chas. Brock, H. S. Brown, S. T. Comfort, J. S. Dempsey, R. B. Fisher, J. Hartley, R. K. Mangan, C. T. Miller, D. Richards, M. J. Rotroff, Wood Sanford, G. A. Secor, L. O. Stratton, E. H. Walker and R. Williamson.

Caterpillar Tractor Company, Peoria, Ill., tractor, carryall, tractor excavator, trail builder, winch; L. C. Allenbrand, F. E. Blanchford, Robt. Culshaw, W. W. Cunningham, Gene Larson, J. W. Mohler, B. C. Patten, Ralph Patten and Chas. Slegman.

Chicago Pneumatic Tool Company, New York; air compressor, air hose couplings, electric drills, generator, high-cycle tampers, pneumatic tampers, gasoline-driven tampers, pneumatic spike drivers, pneumatic and electric screw spike drivers, pneumatic clay digger, pneumatic and electric concrete vibrators, impact wrench; H. G. Barbee, J. J. Brown, C. L. Butler, S. E. Congdon, H. R. Deubel, T. P. Harris, W. Pallo-wick, E. S. Rosselle and W. E. Stockwell.

Chipman Chemical Co., Inc., Bound Brook, N. J.; literature on chemical weed destruction; Charles M. Bernuth, N. S. Leavitt, W. H. Moyer, J. Rutan, I. J. Strain and J. A. Williams.

Crerar, Adams & Co., Chicago; literature on rust preventive, snow brooms, track liner, manila rope, handles for track tools, die starter, track and bonding drills, pipe wrenches, crayons, tools, track shovels, tool handles; R. Besant, C. W. Borneman, E. Dunlap, Geo. J. Doyle, W. Harris, Al. Kapola, Irving Poehler, Hugh Stringham and J. M. Temple.

Cullen-Friedstedt Co., Chicago; anti-slip rail tong, moving pictures of rail crane, clamshell and lifting magnet; W. C. Bamber, K. J. Beller, L. B. Bertaux, C. J. Bronez, E. V. Cullen, F. J. Cullen, F. P. Cullen, T. G. Frazee, G. H. Goodell, R. W. Jamison, F. L. Kendig, J. F. Leonard, W. J. Roehl and J. E. Simkins.

Dearborn Chemical Co., Chicago; water treating equipment, pumps, chemical, rust preventives, water testing equipment, chemical proportioning pumps, signal foam-meter, process for corrosion prevention; D. B. Bishop, Don Bodishbaugh, L. D. Brown, G. R. Carr, R. A. Carr, Robert F. Carr, R. F. Carr, Jr., O. W. Carrick, E. M. Converse, E. R. Glover, E. A. Goodnow, L. O. Gunderson, W. H. Hinsch, F. B. Horstmann, J. F. Johnson, S. C. Johnson, E. L. Konigsmark, Mark McBrian, R. J. Maginn, R. O. Milnes, A. C. Moeller, A. M. Novak, R. L. Oliver, C. C. Rousch, A. H. Reynolds and B. H. Stone.

DeSanno & Son, A. P., Inc., Phoenixville, Pa.; abrasive wheels and

One Section of the Exhibit at the International Amphitheatre



- abrasive cutting machine literature; H. A. Conway, Jr., L. G. Martin, E. J. Rohan and W. K. Whelan.
- Dickinson, Inc., Paul, Chicago; smoke jacks, chimneys for small buildings, roof and deck drains, roof ventilators (full size and models), exhaust heads and wall scuppers; A. J. Filkins, E. M. Filkins and H. Knutson.
- Duff-Norton Manufacturing Co., Pittsburgh, Pa.; track jacks, automatic lowering jacks, ball-bearing self-lowering jacks, standard speed jacks, air-motor-operated power jacks; sidelift track jack, journal jack, tie spacer, track lining jack, bell base screw jacks, bridge jack, tie puller; Robt. G. Allen, A. S. Anderson, D. F. Evans, Walter Floyd, J. Gilchrist, George Mayer, N. A. Sinclair and J. F. Van Nort.
- Eaton Manufacturing Co. (Reliance Spring Washer Division), Massillon, Ohio; rail joint spring washers, rail bonding washers, locomotive spring washers; E. D. Cowlin, E. C. Gross, H. J. McGinn, R. L. Shireman and A. H. Weston.
- Elastic Rail Spike Corp., New York; elastic rail spike; W. A. Fisher, A. C. Jack and B. Kuckuck.
- Electric Tamper & Equipment Co., Ludington, Mich.; electric vibratory tampers, gas electric generator sets, vibrators for concrete placement, step-cut spotting and full line of regular tamping blades, including skeletonizing blade; 1, 2, 4, 8, 12 tapper power units and literature; H. W. Cutshall, Wilbur Davis, J. F. Hensel, R. Herman, Corwill Jackson, J. R. Johnson, E. R. Mason, L. S. Osborn, G. L. Walters, J. Webb and M. S. Westlund.
- Fairbanks, Morse & Co., Chicago; platform and dial scales, parts for motor cars, pumps, heavy and light section cars, patrol cars, welded and bolted steel wheels, one-piece welded steel wheels and differential axle; L. T. Allis, G. R. Anderson, W. F. Anderson, H. J. Barbour, K. E. Barrett, H. N. Baum, E. L. Benson, O. H. Brauer, E. P. Chase, R. V. Cook, E. J. Coverdale, J. F. Cruikshank, W. C. Dehn, C. T. Fugitt, E. C. Golladay, W. R. Grant, D. F. Hayes, D. Hopkins, E. F. Kultchar, R. F. Lane, D. K. Lee, M. B. MacNeille, L. H. Matthews, J. M. McCarthy, C. G. Mahana, L. F. Munson, W. L. Nies, C. B. O'Neil, J. W. Prewitt, C. A. Rauch, C. E. Reed, C. R. Turner, H. E. Vogel and C. H. Wilson.
- Fairmont Railway Motors, Inc., Fairmont, Minn.; ballast drainage car, gang cars, standard section cars, inspection cars, light section cars, bridge and building cars, heavy duty cars, weed mowers, motor car accessories; George Adams, O. F. Banke, W. A. Banke, C. P. Benning, John Boyce, C. W. Brhel, W. D. Brooks, K. K. Cavins, C. J. Dammann, W. G. Day, D. E. Doolittle, Ralph B. Evans, I. N. Eustis, A. R. Fletcher, C. H. Johnson, W. F. Kasper, H. R. Langman, R. H. McCune, J. T. McMahon, G. E. Neffeler, V. Pagett, R. W. Payne, H. W. Protzeller, C. L. Rager, W. H. Ripken, F. G. Simmons, H. A. Sly, R. W. Stenzel, Ira Sublett, J. P. Wainscott, L. D. Whitaker and W. M. Williamson.
- Gary Screw & Bolt Co., Chicago, Ill., and Pittsburgh, Pa.; giant-grip dowels, double-grip spikes, dowel studs, various types and sizes of bolts, nuts and rivets; G. J. Garvey, W. N. Hoelzel, M. G. Kirk and P. Robinson.
- Graver Tank & Mfg. Corp., East Chicago, Ind.; display and models of water treating plants; Harvey Blankenship, J. J. Felsecker, C. M. Stephens, J. Thinnies and E. W. Welp.
- Hayes Track Appliance Co., Richmond, Ind.; models of bumping post and wheel stops, moving exhibit of derail; B. E. Hayes, S. W. Hayes, S. W. Hayes, Jr., H. J. Mayer and P. C. McClure.
- Hogan, George M., Chicago; right-of-way tractor mowing machine, one man track tool; V. G. Cartier, J. T. Flynn, K. E. Gifford, G. M. Hogan, J. E. Hogan, H. S. Johnson, A. F. McCoole, D. L. O'Brien and S. H. Smith.
- Holland Company, Chicago; models of snubber spring, vibration models; A. H. Carlson, C. J. Holland, C. E. Holland and C. W. Wolf.
- Homelite Corp., Port Chester, N. Y.; portable generators, portable pumps; F. S. Dixon, R. J. Edbrooke, R. C. McDonald and Nelson Thompson.
- Hubbard & Co., Pittsburgh, Pa.; track tools, nut locks, spring washers and anti-creeper; William Joyce, J. F. W. Kruse, L. J. Wenzel and John Wincrantz.
- Industrial Brownhoist Corp., Bay City, Mich.; moving pictures of Diesel-operated locomotive cranes; T. G. Frazee, J. H. Frundt, J. B. Hayden, Hoyt E. Hayes, A. P. Lyvers, J. N. Meade, Melvin Pattison, Max Riebenack III, E. W. Taylor and C. H. White.
- Ingersoll-Rand Co., New York; 8-tool crawler compressor, 4-tool crawler compressor, 4-tool spot tapper, pneumatic tools, motor-pump, tie tampers, rail drills and track wrenches, spike drivers and pullers and pneumatic hoist; G. E. Bridge, W. J. Heinz, H. L. Kent, L. A. Luther, R. C. Omar, K. I. Thompson, T. H. Wiegand and George Williams.
- International Harvester Co., Chicago; tractor with front end loader, literature and pictures of tractors and trucks; J. S. Erskine, R. C. Flodin, Neal Higgins, S. E. Houston, Don Jones, M. F. McCarthy, W. M. Parrish, M. F. Peckels, Geo. Schantz, K. O. Schreiber, S. L. Siegfried and A. W. Turner.
- Jacobsen Manufacturing Co., Racine, Wisc.; gasoline motor scythes; L. A. Ferguson, E. A. Jacobsen, O. T. Jacobsen, Wm. Krenzke, E. A. Larsen and A. H. Roper.
- Johns-Manville Sales Corp., New York; roofing, transite pipe, asphalt mineral-surface bridge plank, pipe insulation, insulating board, asphalt tile flooring, soft mechanical packing, asbestos roofing shingles, asbestos siding shingles and clapboards, asbestos wall board, flat and corrugated transite, transite smoke jack, rock wool insulation batts and asbestos wainscoting; P. R. Austin, J. D. Baker, C. E. Bryant, C. S. Clingman, S. H. Flannagan, F. J. Horne, R. J. Offutt, Thomas O'Leary, Jr., C. M. Patten, H. R. Poulson, W. W. Prosser, P. E. Redding, R. P. Townsend, J. H. Trent, F. C. Vandervort, E. H. Wells, Jr., and L. T. Youhn.
- Jordan, O. F. Co., East Chicago, Ind.; movies of Jordan spreader, model of Jordan spreader, photos of Jordan spreader; A. W. Banton, J. C. Forbes, H. M. McFarlane, W. J. Riley and C. W. Shipley.
- Joyce-Cridland Company, Dayton, Ohio; automatic lowering jacks, geared ratchet lever jacks, single and double acting brake jacks, plain lever jacks, self-lowering jacks, geared screwed jacks, air powered jacks, journal jacks, locomotive screw jacks, push-pull jacks, hydraulic jacks of all types for any application; Huston Brown, J. P. Gentry, Kert Hott, M. P. Smith, Don W. Switzer, C. N. Thulin, E. E. Thulin and W. E. Webster.
- Kalamazoo Railway Supply Co., Kalamazoo, Mich.; heavy and light-duty motor cars, pressed steel and wood center motor car wheels, track gages, track level; H. J. Armstrong, L. Boswell, C. W. Croasdill, R. E. Keller, F. E. McAllister, E. C. Pehler, P. J. Robischung and Z. A. Toye.
- Lehon Co., Chicago; prepared roofing, asphalt shingles, asbestos shingles, cold process roofing, roof coatings; C. E. Croissant, John Eipper, Tom Lehon, E. A. Leonard, R. J. Mulrone, A. C. Senseney, J. W. Shoop and H. A. Wolfe.
- Lewis Bolt & Nut Co., Minneapolis, Minn.; hook bolts, guard rail lag screws, timber bolts, cribbing bolts, guard rail bolts, washer nuts; R. B. Hill, H. W. Johnson, Fred Kimmel, Joseph Leonard and C. E. Murphy.
- Lundie Engineering Corp., New York; tie plates, spring clip, tie tongs, rail lubricator; L. B. Armstrong, W. B. Joyce, Chas. Stone and O. W. Youngquist.
- Magnaflux Corporation, Chicago; Magnaflux testing equipment and samples of defective parts; J. E. Clark, Taber de Forest, J. E. McMahon, Jr., H. Migel and W. E. Thomas.
- Maintenance Equipment Co., Chicago; rail and flange lubricators, switch-point protector, blue-flag derail, pictures of three-man rail layers, model train, track and right of way showing Maintenance Equipment installations; S. E. Bates, D. M. Clark, L. S. Johnson, E. Overmier, T. E. Rodman, G. L. Springborn, P. A. Wells, Jr., and P. A. Wolff.
- Mall Tool Co., Chicago; portable gasoline driven generators, 5-hp. gasoline rail grinder, cross-slotting attachment, surface grinding and switch point and stock rail grinding attachments, also electric vibrator, saws and drills, 3-hp. multi-purpose b. & b. unit with vibrator, chain saw, pneumatic, electric and gasoline driven chain saws, sump pump, wire brush, drills, pole gainer, 12-in. pneumatic circular saw; R. B. Burgwald, Stan. Gromnicki, J. Isaacs, A. W. Mall, F. McGonigle, Ted Murphy, D. L. O'Brien, M. Rehnquist and Geo. Secor.
- Master Builders Company, Cleveland, Ohio; nonshrink cement for grouting and concrete repairs, water-reducing agent for concrete, material for armoring floors, quick-setting materials for tunnel linings, literature on masonry maintenance, rust joint iron for emergency grouting; L. Johnson, Don Lee and B. R. Wood.
- Metal & Thermit Corp., New York; welding electrodes, Thermit pressure welding equipment for rail joints, pressure and compromise weld joints; C. M. Lippincott, Anton Lucas, J. B. Tinnon, H. T. Thompson, L. G. Vock and C. D. Young.
- Morden Frog & Crossing Works, Chicago; adjustable rail brace, switch accessories, guard rail, split switch; E. C. Argust, R. A. Brown, T. F. Carlin, F. W. Carter, W. J. Church, W. Homer Hartz, Chas. Kane, G. F. Killmer, Lyle Martin, C. E. Murphy, J. B. Peddle, L. C. Reeb.
- Morrison Railway Supply Corp., Buffalo, N. Y.; wood preservative, grinding wheels, welding rods, switch point guard, literature on welding service; G. J. Diver, R. L. Morrison, E. Smith and D. R. Vogel.
- Moto-Mower Company, Chicago; power driven mowers and literature; L. C. Meskimen, Mrs. L. C. Meskimen and J. O. Spottswood.
- Murdock Mfg. & Supply Co., Cincinnati, Ohio; water service boxes, hydrants, washers, O. O. C. air and hot and coldwater valves and drinking fountains; Thos. E. Bart.
- National Aluminate Corp. of Chicago; chemical proportioning pump, new type of sensitive flow switch, photometer for rapid analysis of water using principle of the electric eye, embrittlement testing apparatus, unit chemical vat with all proportioning and electrical control equipment integral, sectional chemical proportioner pump, waterlab cabinet, continuous blow-down equipment for locomotive boilers, literature, photographs, action pictures, samples of corrosion and incrustation in pipe; W. R. Anthony, C. M. Bardwell, R. A. Bardwell, B. D. Barger, R. G. Bielenberg, C. A. Brown, J. L. Callahan, P. H. Coleman, L. E. Elliott, P. W. Evans, R. E. Falkenburg, C. B. Flint, J. L. Gibboney, R. V. Lucas, L. L. Lux, H. A. Marshall, V. E. McCoy, A. F. McNeil, E. M. Miller, H. H. Richardson, H. D. Shaw, G. D. Sievertsen, T. G. Windes and E. L. E. Zahn.
- National Carbide Corp., New York; C. B. Armstrong.
- National Lead Company, New York; Dutch Boy red and white lead, replica of bridge model showing built-up system of painting, industrial paint for railway maintenance, general maintenance paint; R. D. Baker, W. S. Carlisle and Hugh Millen.
- National Lock Washer Co., Newark, N. J.; ferrule wedges for track tool handles, spring washers; F. B. Archibald, R. L. Cairncross, T. C. Coleman, Jr., Bailey Cowan, G. H. Goodell, Allen T. Hyatt, C. H. Loutrel, George Prest, W. H. Reeves and G. E. Webster.
- Nichols, Geo. P. & Bros. Inc., Chicago; models of turntable trucks, with and without bearings, model of transfer table; B. F. Goldman, S. F. Nichols, S. H. Nichols and G. M. Shearer.
- Nordberg Manufacturing Co., Milwaukee, Wis.; surface grinder, utility grinder and accessories, lag-screw driver, track drill, adzing machine, power jack, spike puller, power track wrench, frog and crossing grinder, precision grinder; L. P. Brassy, W. E. Bugbee, C. P. Clemens, W. W. Fitzpatrick, C. K. Jensch, Eugene Larson, R. W. Payne, F. M. Read, Will Reeves, S. H. Smith, H. H. Talboys, Halwin Wegner and F. S. Wonham.
- Oxweld Railroad Service Co., Chicago; pictures of pressure butt-welding and end hardening of rail and flame-cleaning of structural steel; welding equipment, flood-lights, heat-treated joints, samples of pipe welding, wrinkle-bending of pipes and heat-straightened angle bars; Lem Adams, M. C. Beymer, G. P. Bogert, M. Burnett, Jr., W. E. Campbell, E. Cordeau, S. P. Donegan, F. J. Duffie, F. Finstwaite, H. V. Gigandet, E. H. Hall, Jr., F. C. Hasse, H. E. Hoffman, J. L. Hoffman, W. A.

Hogan, S. Hopkins, P. Hunter, Jr., May Kinney, V. P. Kojeski, Wm. Matthes, G. B. Moynahan, D. H. Pittman, J. H. Rodger, L. C. Ryan, H. W. Schultze, J. C. Stephenson, F. C. Teichen and J. E. Winslow.

P. & M. Company, Chicago; rail anchors and bond wire protectors; S. M. Clancey, G. W. Dunn, J. J. Gallagher, D. T. Hallberg, R. D. Hawley, P. H. Hamilton, G. E. Johnson, L. S. Johnson, J. E. Mahoney, W. A. Maxwell, G. E. Olson, R. W. Payne, F. A. Preston, W. H. Reaves, M. K. Ruppert, L. S. Walker and F. R. Wood.

Philadelphia Steel & Wire Corp., Philadelphia, Pa.; display of spring washers; Waldo E. Bugbee, Charles E. Collins, Geo. M. Hogan, John E. Hogan, John M. Newkirk, R. E. Schatmeyer, Stanley H. Smith and C. C. Washer.

Pocket List of Railroad Officials, New York; copies of publication; Harold A. Brown and B. J. Wilson.

Portable Plating & Equipment Co., Chicago; display on Firestone rubber tie plates, Atlas journal jacks; J. E. Buckingham, A. W. Donop, T. W. Stedman and S. A. Stephens.

Power Ballaster Company, Chicago; photographs working model of cribbing machine, motion pictures, power track ballaster; W. E. Bugbee, Ralph Payne, F. H. Philbrick, L. L. Schreck, and Stanley Smith.

Rail Joint Co., New York; standard and insulated joints, armored insulated joint, alloy compromise joints, center-overfill joint, insulating fibre, plastic rail joint packing, photo-elastic demonstration of load effect; Alex Champan, E. A. Condit, W. E. Gadd, S. Harrison, H. C. Hickey, G. H. Larson, J. N. Meade, R. W. Payne, C. F. Reade, Thos. Ryan and E. F. Schermerhorn.

Railroad Accessories Corp., New York; power rail drill, power track machines for tightening and loosening nuts and setting screw spikes, micro cutout and tie boring machine; E. M. Deems, Jr., S. G. Ellis and B. A. Lundy.

Rails Co., New Haven, Conn.; compression screw spikes, compression spring rail spike, compression-type rail fastenings, M. & L. plate assembly, full-throated cut spikes, oil snow melters, rail, flange and curve lubricator, crossing flangeway bracket and head insert for worn joint bars and new rail fastener; R. E. Bell, L. T. Burwell, Milburn Moore, W. A. Peck and J. V. Wescott.

Railway Age—Railway Engineering and Maintenance—Railway Engineering and Maintenance Encyclopedia, New York; copies of publications; Geo. E. Boyd, M. H. Dick, S. W. Hickey, Neal D. Howard, Elmer T. Howson, P. D. Juraschek, F. C. Koch, Henry Lee, J. G. Little, H. E. McCandless, H. H. Melville, C. W. Merriken, H. A. Morrison, Charles Packard, Maurice Peacock and J. S. Vreeland.

Railway Maintenance Devices, Inc., Chicago; tie puller-pusher, sectional track display and live Bulldogs; Joe Brown, J. A. Colberg, G. H. Connolly, H. H. Johnson, L. I. Johnson, Porter Laughlin and C. L. J. Welch.

Railway Purchases and Stores, Chicago; copies of publication; J. P. Murphy, Jr., K. F. Sherran and Ed. Wray.

Railway Track-work Co., Philadelphia, Pa.; grinder, portable stockrail grinder, rail-point cross grinder, portable track grinder, samples of abrasives, literature, track drills; H. M. Moorhead, A. M. Nardini and J. Roche.

Ramapo Ajax Div. (American Brake Shoe & Foundry Co.), New York; safety switch stands, rigid switch stands, rail lubricator, literature on manganese crossings, Samson switch with improved fittings, switch point locks; T. E. Akers, G. A. Carlson, G. M. Cooper, C. P. Corrigan, J. E. Davidson, R. M. Evans, C. Godfrey, R. M. Helms, A. F. Hess, D. F. Hilton, J. V. Houston, A. F. Huber, J. S. Hutchins, J. P. Kleinkort, R. P. McClave, W. Muller, E. F. Needham and W. A. Peddle.

Republic Steel Corp., Cleveland, Ohio; track bolts, track spikes, tie plates, fencing and barbed wire, steel fence posts, nails and staples, bolts and nuts, turnbuckles, guard rail for curves, culvert sections, tunnel liner, literature and pictures of armored concrete highway crossing; A. J. Brandt, E. K. Connelly, J. R. Fraine, A. Foukal, N. W. Halls, B. F. Handloser, W. H. Hanna, W. E. Lambert, H. L. Miller, W. T. O'Neill, H. P. Pickering, A. J. Roof, C. W. Ruth, Frank Schumacher and L. L. Solger.

Sperry Products, Inc., Hoboken, N. J.; chart showing mileage tested over

11 years 10 times, picture showing 10 years improvement in detector car, fractures in rail under engine burns, display of rails welded by electric flash butt weld, moving picture showing installation of Sperry weld on Paulista Road of Brazil; E. A. Crawford, H. C. Drake, J. B. Farwell, C. W. Gennett, Jr., T. E. Gilhooley, G. V. Jewell, W. F. Kohl, S. R. Lewis and D. L. Perry.

Syntron Company, Homer City, Pa.; tie tampers, generator set, dry feeders, vibrators, (internal and external), electric hammers and saws, drills; D. G. Black, R. A. Conrads, J. F. Leonard, M. I. McCarthy, N. C. McKelvy and J. A. Roche.

Teleweld, Inc., Chicago; joint shims, samples of welded joints, heat-treated joints, Brinnell-hardness tester, propane heater for rail end welding; T. L. Borman, C. E. Buck, G. A. Greene, John E. Hogan, C. W. McKee, H. E. McKee, E. J. Payton, J. A. Roche and Stanley H. Smith.

Templeton, Kenly & Co., Chicago; rail pullers and expanders, tie spacer, track jacks, push and pull jacks, bridge jacks, ball bearing screw jacks, journal jacks; W. C. Cornu, H. C. Dilsizian, R. B. Hill, W. H. Kreer, P. H. McManus, N. L. Montgomery, William Simpson and J. B. Templeton.

Timber Engineering Co., Washington, D. C.; timber connectors, split rings, toothed rings, toothed or flanged shear plates, spiked grids and clamping plates for bridge and building construction, and termite shields; J. B. Jordan and L. P. Keith.

U. S. Wind Engine & Pump Co., Batavia, Ill.; water-column, valves, riser pipe frost-proofing, switch stands, float valves and electric pump jack; H. Beem, A. W. Swanson and C. E. Ward.

Woolery Machine Co., Minneapolis, Minn.; display of power tie cutting machine and blades, ballast dresser, creosote sprayer, pictures of weed burner; A. J. Franke, A. C. Heath, W. A. Peck and H. E. Woolery.

Young & Greenawalt, Chicago; drainage literature, photographs, culvert pipe—plain or asphalt coated, reinforced paved invert, subdrainage pipe, perforated pipe, sectional plate and heavy-duty plate; W. P. Greenawalt, E. H. Hulbert, W. J. Kelley, P. J. Spears, R. L. Stimson, Jos. Wysong and J. L. Young.

Engineering Officers Prepare to Meet Increasing Demands

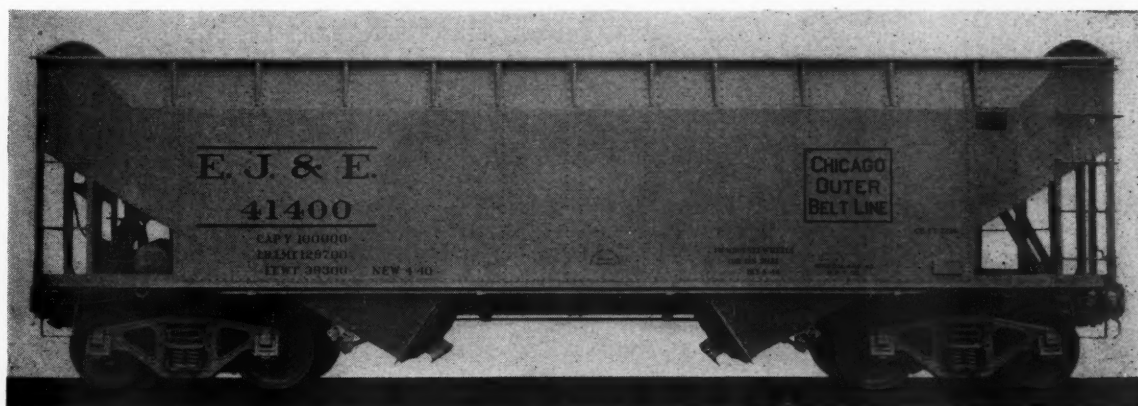
(Continued from page 483)

the committee first dealt briefly with the economics of fire-proofing and then listed the more common methods of decreasing the fire hazard at trestles. In the order of their efficiency these are: (a) Ballasted deck on trestle; (b) metal covering over deck; (c) bituminous mastic covering over deck with sand or limestone chips; (d) metal covering over stringers and caps; and (e) fire retardant salts or fire resisting paint.

The committee also presented revised versions of certain paragraphs in the Manual under the heading "Best Method of Fire-proofing Wood Bridges and Trestles," and recommended that they be adopted for inclusion in the Manual in place of the existing material. With the revised material the committee offered four drawings illustrating (1) an earth fill break in a long trestle, (2) reinforced concrete piers and bents as fire stops, (3) wood bents faced with fire resisting material, and (4) the application of mastic material to open-deck structures. These drawings were also recommended for adoption and inclusion in the Manual.

The committee's recommendations were approved without comment.

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50-Ton Hopper Car Made by the Ralston Steel Car Company

Communications and Books . . .

Can It Be That Bureaucrat Paul Truitt Is Slipping?

NEW YORK.

TO THE EDITOR:

Why don't you write something for the *Age* about the inconsistency between the recent Supreme Court decision in the Sears-Roebuck use tax in Iowa and Mr. Truitt's tom-tomming about "interstate trade barriers" (*Railway Age*, February 22, page 356)?

If it is not an interstate trade barrier to put a 2 per cent tax on goods coming into Iowa by mail, why is it a trade barrier to charge a license tax on goods coming into Iowa by truck? But, the Supreme Court said the former is O. K. and Mr. Truitt has not protested.

L. J. KIERNAN.

How the Spotting Charge Drives R. R. Traffic Away

CHICAGO.

TO THE EDITOR:

Your editorial on spotting charges in your December 21 issue was very much to the point and discloses knowledge of the situation. Ours is one of the large industries affected by the order of the Commission cutting off service at the outside gate of our plant.

It was our practice to do about half of the spotting service with our own engine and crew in the daytime. Carriers did the rest of it with their engine and crew at night. We have only a small engine and it can do only so much work, so when the Commission's order went into effect we either had to put on another engine and crew or find some way of reducing the number of cars handled in and out of the plant. The railroads refused to do any work inside of the plant, not even intra-state movements, without a substantial charge in addition to the line haul rates.

The lawyers grabbed hold of the matter and—enough said. We found ways of reducing the number of cars handled. Everybody knew the highway trucks would go to any accessible place in the plant to pick up or deliver shipments so we made some changes in the layout and the story is this (stated percentage-wise) of the tonnage shipped by truck:

1938—100%
1939—165%
1940—210%

These percentages are based on 1938 tonnage and they mean many millions of pounds a year. If the Commission thinks that they are helping the railroads to conserve revenues, they are all cockeyed—because, as a matter of fact, the railroads are actually losing money; and why in heaven's name they don't do something

about it is beyond understanding. It looks like they were laying down and taking it; but, anyhow we'll cease from worry and expect to go along all right.

J. A. BROUGH.

New Books

Mastering Momentum. By Lewis K. Sillcox, D. Sc. Published by the Simmons-Boardman Publishing Corporation, New York. 274 pages, 130 illustrations, 6 in. by 9 in. Cloth binding, \$2.50.

This volume is an adaptation of material contained in six papers privately published and presented under the general title "Mastering Momentum" at the Massachusetts Institute of Technology over a period of several years. There are six chapters. The first, and by far the most extensive, deals with the mechanics of train operation and train braking. This is a condensed survey of braking developments and braking problems. In it will be found descriptions of methods employed in calculation of stopping time and distance curves as well as those involved in the operation of the brake itself. Other chapters deal with railway car wheels, railway car axles, locomotive and car-truck design, and draft gears. Each chapter contains a wealth of information of value to the student. Much of it is also valuable reference material for those engineers not specialists in the subjects treated. The reference value of the book is enhanced by a topical index.

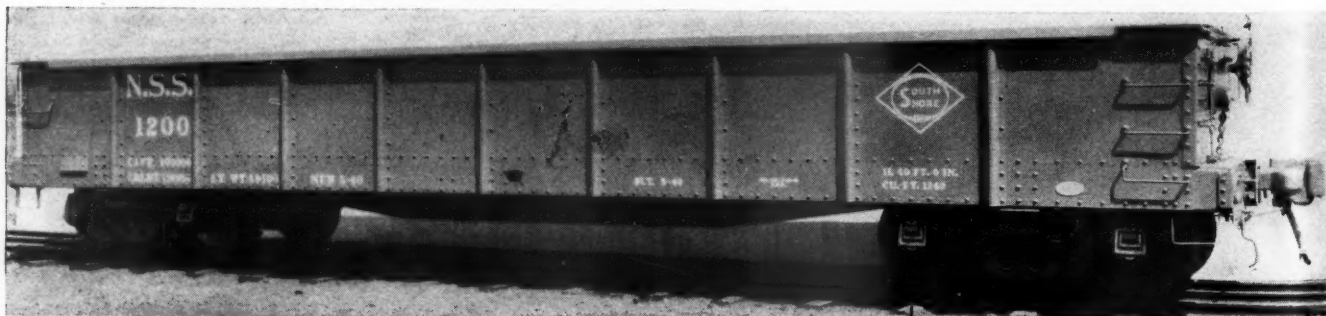
Men and Volts, by John Winthrop Hammond. 436 pages. 5 in. x 9 in. 117 illustrations. Cloth binding. Published by J. B. Lippincott Company, Philadelphia, Pa. Price \$2.50.

This is a dramatic history of practical electrical development, with an intimate quality arising from the fact that the author lived through the period covered and personally was acquainted with most of the principal characters. It describes the growth and development of the General Electric Company and that of its predecessors, which were consolidated to form the present organization. Although it is limited essentially to the work done by these companies, it supplies a word picture of what has been required to bring the electrical industry to its present high state of usefulness. The period covered begins about 1878 and, although the author died in 1934 and his manuscript closed with the year 1922, the completed volume has been brought up to date by Arthur Pound, well-known writer on industrial subjects.

Of specific interest to transportation men are those chapters in the book which cover early electric traction, the growth of the street railway, and the electrification of the Chicago and Manhattan elevated lines, the New York Central and the Chicago, St. Paul, Milwaukee and Pacific.

It makes interesting reading for everyone, affords valuable information for the electrical man and, in substance, establishes a trend which the imaginative may project into the future.

* * * *



Newburgh & South Shore 50-Ton Gondola Built by the Magor Car Corporation

NEWS

1940 Saw Great Efficiency Boost

Speed, tons per train, g. t. m. per train-hour, fuel utilization among improved factors

New high records in operating efficiency were attained by the railroads in 1940, according to complete reports just received for that year, J. J. Pelley, President of the Association of American Railroads announced on March 11. The Pelley statement summarized the "outstanding operating performance of the railroads" in 1940 as follows:

1. The average amount of freight carried per train was greater than ever before on record.
2. Freight was transported over the rails at an average speed never surpassed and approximately 62 per cent higher than twenty years ago.
3. Freight train performance per hour was approximately twice as good as that of 1921.
4. Freight locomotives attained a new high mark in average daily mileage.
5. Utilization obtained from freight cars was greater than ever before.
6. Fuel efficiency in freight service was higher than ever before.
7. Number of freight cars in need of repair was lowest on record.

"The outstanding feature in railroad performance," Mr. Pelley said, "was the increase in the amount of freight that was carried per train, that average in 1940 having been 849 tons compared with 813 tons in 1939, and 804 tons in 1929, the year of heaviest traffic in the history of the railroads. Freight train performance in 1940 was approximately twice that of 20 years ago. That is, gross ton-miles per train hour increased from 16,555 in 1921 to 33,808 in 1940, or 104 per cent, while net ton-miles per freight train hour increased from 7,506 in 1921 to 14,027 in 1940, or 87 per cent. These are new high records in both instances.

"Freight locomotives in 1940 operated a daily average of 107.2 miles, which also was a new high record. The average daily movement of all freight cars, which includes those being loaded and unloaded, was 38.7 miles in 1940 which also was a new high record. Net ton miles per freight car per day was 661 ton-miles, also a new record. The previous record was established in 1937 with an average of 625 ton-miles per day.

"Fuel efficiency in freight service was never better than in 1940. Despite the in-

creased weight per train and the increase that has taken place in recent years in the average speed of trains, the railroads in 1940 averaged 112 pounds of fuel for the movement one mile of 1,000 tons of freight and equipment. This average has never before been attained. For each pound of fuel used in freight service in 1940, the railroads hauled 8 $\frac{1}{10}$ tons of freight and equipment one mile compared with 6 $\frac{1}{2}$ tons in 1921, or an increase of 44 per cent.

"Railroads in 1940 had an average of 144,249 unserviceable freight cars, the lowest number in need of repair on record. This was 7.9 per cent of ownership. Since then, this number has been further reduced with the result that on February 1 this year there were only 107,596 unserviceable cars, or 6.7 per cent of ownership.

"The railroads can well be proud of their new high efficiency record in 1940. Taken as a whole, the year's performance was the best in railroad history. Efficiency in railroad operation has been constantly increasing in the past twenty years due to improvements in operating methods, better freight cars and locomotives, improved signaling devices and terminals. The railroads of the United States are furnishing the shippers of this country with the most economical and dependable transportation service ever provided, and will continue to do so. The railroads are ready to do whatever they may be called upon to do."

O. & W. Publishes "Bird's Eye" Booklet

The 576-mi. New York, Ontario & Western has published an attractive 10 $\frac{1}{2}$ in. by 8 in., eight-page booklet giving a "bird's eye view" of the road's facilities and the country it traverses. Designed to acquaint shippers and receivers of freight with interesting facts about the road, the booklet is informal in character and leans heavily on photographs. These show a few of its 118 locomotives, its main yard and shops at Middletown, N. Y., and features of its pick-up and delivery service.

R. C. C. Distribution

The Railroad Credit Corporation will make a liquidating distribution on March 31 of two per cent of the Fund as of February 28, amounting to \$1,469,219.60. Of this amount \$1,266,209.83 will be paid in cash and \$203,009.77 will be credited on carriers' indebtedness to the Corporation. This will bring the total amount distributed to \$61,707,223.23, or 84 per cent of the original Fund contributed by carriers participating in the Marshalling and Distributing Plan, 1931. Of this total, \$33,705,298.73 will have been returned in cash and \$28,001,924.50 in credits.

More Research on the Big Ditch

Conclusions having been handed them in advance, researchers seek "facts" to fit

Further support for the St. Lawrence waterway and power project has come to President Roosevelt in the second of that series of seven reports which are being prepared in the Department of Commerce at the President's request. Entitled "Shipping Services on the St. Lawrence River," the report, made public on March 7, makes a general finding that there are "no physical or climatic reasons why the St. Lawrence route should be unattractive to shipping lines a good part of each year"; and promises that the economic considerations which will govern the actions of ship owners—"principally the availability of cargo at profitable rates"—will be "extensively analyzed" in the next report of the series.

As pointed out in the *Railway Age* of February 15, page 331, where the publication of the series' first report was noted, the reports are being prepared under the direction of Dr. N. R. Danielian, director of the St. Lawrence Survey, which has been under way for about a year.

In the present report, as the Department of Commerce's press release puts it, "the feasibility of the enlarged St. Lawrence Waterway—including the benefit to national defense—is exhaustively discussed." In connection with national defense, the report reaches the conclusion that the seaway would make possible naval construction on the Great Lakes, because "all classes of cruisers, destroyers and submarines" could "easily" navigate it "in ample safety . . . only battleships and aircraft carriers could not be accommodated in the locks because of limitations of width and depth."

Meanwhile the report had examined and rationalized answers to such arguments as those holding that the navigation season would be limited due to climatic conditions; that restricted channels would make navigation and ship operations slow and hazardous; and that the proposed 27-ft. canals would not admit a large part of world shipping. Dr. Danielian's letter of submittal summarizes the report's conclusions as follows:

1. The development of the upper St. Lawrence to a depth of initially 27 feet would provide a satisfactory waterway 2,350 miles into the heart of the North

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Calls Pipe Lines Monopoly Device

Federal attorney asserts ownership of own transport gives advantage to big cos.

So-called integrated oil companies earn their profits "largely in the divisions in which the monopoly position is most clearly indicated," and the present-day pipe line system "is a virtual monopoly of the majors," affording them their "strongest" means of "competing against independents." These are typical comments on the competitive advantages of pipe lines, found in Monograph No. 39 entitled "Control of the Petroleum Industry by Major Oil Companies," which has been made public by the Temporary National Economic Committee—the so-called Monopoly Committee.

The study embodied in the monograph was made for T. N. E. C. by Roy C. Cook of the Department of Justice's Anti-Trust Division. Like others, it carries an acknowledgment from the T. N. E. C. chairman—Senator O'Mahoney, Democrat of Wyoming—with the usual statement to the effect that responsibility for every statement rests entirely upon the author. Also, there is a letter of transmittal from Assistant Attorney General Thurman Arnold which stipulates that the conclusions "are solely those of the author and are not to be considered as the opinions or policies of the Department of Justice."

Before getting into his chapter on "Crude Oil Transportation," Mr. Cook undertook to make his point that "as a result of integration it is possible to lose money in one division and show a profit at the end of the year on the entire activities." He cited data on 1938 earnings by divisions reported to T. N. E. C. by eight of the majors. Six of these "had an average loss on marketing in 1938 of 6.7 per cent and two reported profits of five and 4.5 per cent each." Meanwhile, "the average rate of return for pipe line companies of the majors was 26.5 per cent."

The chapter on crude oil transportation points out that pipe lines afford the most efficient form of land transportation, adding that "the advantage of pipe lines over rail transportation is so great that no oil company has been able to attain very much importance in the industry without the use of pipe line facilities." Then comes the aforementioned reference to the pipe lines being the majors' "strongest means" of competing against the independents, following which it is recalled how the Interstate Commerce Commission in 1906 found that the "Standard Oil Trust established its greatest control of the petroleum industry through pipe lines." The control that the majors have today over pipe lines, Mr. Cook adds, "is in many respects similar to that found by the commission to exist in 1906."

Discussing the effect of pipe line profits on competition, Mr. Cook cites data on pipe line profits and asserts that "the exorbitant rates charged by the majors, in addition to the high minimum tenders, re-

sulted in a complaint being made to the Interstate Commerce Commission in 1934." This reference is to the No. 26570 proceeding wherein the commission has ordered pipe lines earning over eight per cent to show cause why an order should not be entered requiring rate adjustments calculated to reduce their earnings to the eight per cent basis. The commission's decision was reviewed in the *Railway Age* of January 11, page 145, while its later action postponing the effective date of its order was noted in the issue of March 1, page 392.

Coming to its consideration of the status of pipe lines, the monograph appraises "the record" as indicating that "they are common carriers in name only and not in fact." The passage of the Hepburn Act in 1906 making pipe lines common carriers was "of little help to the independents," because "the majors' regulations requiring minimum shipments of 25,000 to 100,000 barrels had an important effect in keeping the independents from using the lines." Later on comes an assertion to the effect that for a number of years subsequent to the Supreme Court's 1914 decision upholding the Hepburn Act, the pipe lines "through monopolistic shipping requirements . . . entirely nullified the common carrier law so far as eastward shipments from the Mid-Continent oil field to independent refiners were concerned." Furthermore, it is declared that "the ownership of pipe lines makes it possible to fix the price of crude oil"; and "it is now a buyer's market due to pipe lines."

In a section on dividends paid to the majors by pipe line affiliates, the statement is made that from 1929 through 1937 the average ratio of dividends to capital stock was 33.2 per cent—"only one pipe line ever became bankrupt." In a subsequent discussion of gasoline transportation, the monograph employs the term "rebate" to characterize "the differences between the pipe line costs and the corresponding tariff rates." The "rebates" are said to be received by the majors "in the form of stock dividends."

N. E. Shippers Board to Meet March 26

The New England Shippers Advisory Board will hold its 33rd regular meeting at the Taft hotel, New Haven, Conn., on March 26. On the evening of the preceding day the board will hold a loss and damage prevention meeting. Speaker at the luncheon will be Tom J. McGrath, executive director, National St. Lawrence Project Conference.

Southeast Shippers Board to Meet March 20

The Southeast Shippers Advisory Board will hold its 56th regular meeting at the Buena Vista hotel, Biloxi, Miss., on March 20. Holcombe Parkes, associate director of public relations of the Association of American Railroads, will be the principal speaker, taking the subject "Democracy at Work." Other speakers will include R. E. Barr, freight traffic manager, Illinois Central, on the subject of railroad traffic research, and Clayton Rand, editor of the Dixie Guide of Gulfport, Miss.

TNEC "Experts" Scold RRs Again

Scissors-and-paste job on old slanders, with a sprinkling of new misinformation

The railroads are sharply criticized for their lobbying activities both in Washington and in the states and for their so-called "social performance" in two monographs released this week by the Temporary National Economic Committee (Monopoly Committee). The first of the monographs is numbered 26, "Economic Power and Political Pressures" and is authored by Donald C. Blaisdell and Jane Greverus, economic experts on the committee's staff; while the second, No. 7, "Measurement of the Social Performance of Business," was written by Theodore J. Kreps, professor of business economics at Stanford University, and Kathryn Robertson Wright, associate economist, bureau of labor statistics, United States Department of Labor.

At one point in the first monograph on lobbying the statement is made that "Estimates of the amount of money spent by the Association of American Railroads and its numerous subsidiaries on propaganda and lobbying activities are so high as to be almost incredible, running to far over \$100,000,000 for the period since 1918." On the question of social performance the authors reach the conclusion that "the performance of the (railroad) industry has been so poor that were the performance in the rest of the economy no better, the total number of unemployed in the United States today would come to something like 25,000,000 instead of less than 10,000,000." These statements are typical of the attitude assumed by the authors of both monographs in regard to the railroad industry.

"While paying lip service to the principle of public regulation," says the first monograph on lobbying, "the railways and electric utilities have done everything in their power to avoid it, or at least to control it in their own interest."

Commenting on the passage last year of the Transportation Act of 1940, the monograph has the following remarks to make:

"Without doubt passage of this legislation represents the successful termination of a long and costly propaganda and lobbying campaign by the railroads. The Association of American Railroads has for many years spent millions of dollars annually in newspaper and magazine advertising, in the publication and distribution of special booklets, and in the establishment of subsidiary propaganda and educational organizations. The Railroad Securities Owners Association, the Fuel Power Educational Foundation, and the Transportation Association, among others, have been organized and financed at least in part by the A. A. R. The latter in turn published various brochures dealing with various phases of the railroad problem, such, for example, as labor (particularly railroad labor), farmers, shippers, and investors."

The monograph goes on to say that so
(Continued on page 497)

Rutland Staff Takes Pay Cut

Employees agree to five per cent pay reduction for two years; strike averted

Threat of a strike on the Rutland was ended at noon on March 6 when representatives of the 1500 employees and the management signed an agreement whereby employees will voluntarily accept a five per cent reduction in basic pay for a two-year period and the receiver will withdraw his notice of the reduction in wages under a sliding scale of from 10 to 30 per cent. Included in the agreement are proposals by the employees for certain operating economies.

Settlement of the controversy was brought about through conferences held by an emergency board appointed by President Roosevelt on February 14 after contesting parties had exhausted all prior provisions of the Railway Labor Act with respect to such controversies. The emergency board was composed of I. L. Sharfman, professor of economics at the University of Michigan; Ordway Tead, chairman of the Board of Higher Education of New York City; and Walter C. Clephane, a lawyer of Washington, D. C., as reported in the *Railway Age* of February 22, page 357. The threatened strike was scheduled for 6 p. m. on February 14 and the receiver's wage reduction the following day.

The agreement, which goes into effect April 1, will remain operative until March 31, 1943, and contains the following major provisions:

(1) Receiver's wage reduction notice, originally promulgated to become effective November 9, 1938, will be withdrawn.

(2) During the period of the agreement a 5 per cent reduction of earnings of all employees who earn \$15 or more per week will be made as a voluntary contribution for the purpose of improving the financial condition of the road.

(3) Payment of \$235,887 of back wages deducted during 1938 and 1939 and due employees by order of the federal district court, may be postponed to April 1, 1943, and will then be made in such amounts as may prove to be practicable without reducing the working capital of the railroad below the sum of \$175,000.

(4) The switcher at Norwood, N. Y., and the second trick switcher assignment at Alburg, Vt., will be eliminated on the basis of a proposal made by employees, for the purpose of effecting an estimated annual saving of \$23,774; in the event that such elimination cannot be accomplished by the agreement alone negotiations looking to this end will be initiated.

(5) All changes in operations involving any substantial reductions in personnel will be inaugurated only after consultation with representatives of the employees.

The agreement was signed by L. G. Morphy, receiver for the carrier and representatives of 15 labor organizations. Shortly after the signatures were affixed, members of the emergency board dispatched a telegram to President Roosevelt, stating that

the strike had been definitely averted and adding: "As will appear in the full report to be submitted to you in due course, this result has been achieved through agreement of the parties upon a constructive solution of the difficulties involved, by the voluntary co-operation not only of the parties directly concerned, but of other major interests equally determined to assure the continuance and support of the essential transportation services of the Rutland railroad."

Professor Sharfman, as chairman of the board issued also a formal statement disclosing that the emergency board had held discussions with other interests besides the employees and the management of the road. He pointed out that "the state Chamber of Commerce and allied civic organizations will seek to secure a lightening of the tax burdens of the road and also to stimulate increases in its revenue-producing traffic by renewed aggressive efforts." He pointed to the settlement of the dispute as "an example of co-operative handling of a community problem of which the state of Vermont may well be proud."

Club Meeting

The Toronto Railway Club will hold a "Ladies' Night" on March 24 at the Royal York hotel, Toronto, Ont., at 8:45 p. m.

T. & T. Section to Meet September 23-25

The Telegraph & Telephone Section of the Association of American Railroads will hold its annual session at the Gibson hotel, Cincinnati, Ohio, September 23 to 25, inclusive.

February Export Freight

Cars of export freight, other than grain, unloaded at Atlantic, Gulf and Pacific ports in February this year totaled 42,149 cars, according to reports compiled by the Manager of Port Traffic and made public March 14 by the Association of American Railroads. In February, 1940, there were 44,732 cars unloaded. Cars of grain for export unloaded in February this year at these ports totaled 2,215, compared with 6,264 in the same month last year.

"No congestion or delay to traffic exists at any of the Atlantic, Gulf or Pacific ports, due to the cooperation of steamship lines, port authorities, exporters and shippers," the A. A. R. statement said.

"Southern" to Make Exhibition Run

The Southern has scheduled an introductory exhibition run of its new "Southerner," luxury all-coach train to be placed in service between New York and New Orleans, La., as announced in last week's *Railway Age*. The train will be dedicated in New Orleans on March 17. The following day the train will be open for public inspection; its trip north will start on March 19. It will be on exhibit at Birmingham, Ala., on March 21; in Atlanta, Ga., on March 22 and will make its way north through other inspection stops to arrive in Washington on March 27. The following day it will go on exhibition, after which it will operate to New York over the Pennsylvania. First regular run is scheduled out of New York on March 31.

More "Make Work" Gets Court O. K.

3-judge bench thinks I. C. C. has power to force abandoned lines to continue jobs

While finding in favor of organized railway labor's contention that the Interstate Commerce Commission has the power to attach labor-protection conditions in abandonment cases, a special three-judge court in the District of Columbia this week handed down a unanimous decision which further held that such a power under the Interstate Commerce Act was discretionary with the commission rather than mandatory. In the decision in the case of the Railway Labor Executives Association and Brotherhood of Railway Trainmen *versus* the United States and the Interstate Commerce Commission, which was written by Chief Justice Groner of the Court of Appeals for the District of Columbia and concurred in by Associate Justice Vinson of the same court and Chief Justice Wheat of the U. S. District Court for the District of Columbia, the unanimous tribunal went on to point out that such labor-protection provisions might be necessary and just in such a case as the instant one in which there was to be a substitution of motor bus service for electric interurban operation, but that they might not be reasonable in an outright abandonment of a whole line where there would be no place to absorb the displaced workers.

The case had arisen out of an appeal of the R. L. E. A. and the Brotherhood of Railroad Trainmen from the commission's decision in Finance Docket No. 12643 wherein the Pacific Electric had been authorized (without labor-protection conditions) to abandon some 88 miles of line in the Los Angeles, Calif., area. Following its decision several years ago in the Chicago Great Western case (207 I. C. C. 315) the commission, through Division 4, had taken the position that it did not have authority under the Interstate Commerce Act, as amended, to insert such conditions in abandonment cases. As a result, it refused to consider testimony from the labor organizations relating to the need for such conditions in the instant case.

The labor unions took the position that because the United States Supreme Court in the Rock Island case last term had found that the commission had power to insert labor-protection provisions in consolidation cases despite the fact that the law did not then specifically so state, such power was also inherent in the section of the law dealing with abandonments. Labor did not ask the court in the instant case to find that such provisions were mandatory, but simply that the commission had such power and should consider the need for them in all abandonment cases. In this respect the labor organizations obtained from the court exactly what they asked for. (Details of the argument before the three-judge court were given in the *Railway Age* of November 30, 1940, page 843.)

It is not known at this time whether an appeal from the decision will be taken

by any of the parties. While it is fairly certain that the labor organizations are satisfied and will not seek a review, it is quite possible that the commission may want a final ruling by the Supreme Court or that either the Department of Justice or the Pacific Electric may be dissatisfied and will file an appeal. All parties have 60 days after the final order is entered in which to take an appeal.

After pointing out that the plan in the case contemplated the abandonment of certain rail lines, the rehabilitation of others, and the substitution of motor bus and motor truck service as a means "of increasing operating revenues, reducing expenses, and rendering a more adequate service to the public," the court goes on to say that it can see little difference between this type of case and one involving consolidation. In the light of the Rock Island case which found power in the language of the 1920 Act to insert labor-protection provisions in consolidation cases, the court feels that the commission should also have such discretionary power in abandonment cases.

"As we have pointed out," continues the opinion, "there is nothing in the 1920 Act itself or in its legislative history which indicates that Congress had in mind either in the case of consolidation or of abandonment the protection of displaced employees. But in the Lowden (Rock Island) case the Supreme Court found in the language of the consolidation section what appeared to it to be a clear implication that Congress, to maintain an adequate and efficient railway system, intended to provide—in the discretion of the commission—for dismissed employees. And this question being settled, and the phrase used in the abandonment section being, as we think, directed to the same end, it is difficult, if not impossible, to deny it a similar implication. In this view, it may very well be considered that in the amendment of the consolidation section in 1940 and the failure to amend the abandonment section Congress merely intended to make the conditions mandatory in the former and leave them simply discretionary in the latter."

After having counsel file briefs on the significance of the legislative history of S. 2009 which culminated in the Transportation Act of 1940, the court said that it feels the legislative history "can throw little light on the extent of the discretionary authority since 1920 to impose conditions" under the abandonment section of the Act.

"In the case of abandonment," explains Chief Justice Groner, "the primary object of the statute is the same, namely, the preservation of an efficient transportation service, which it is easily understandable might be defeated by excessive expenditures from the common fund in the local interest so as to impair the ability of the carrier properly to serve interstate commerce. But in the case of an abandonment proceeding the second objective—protection of displaced personnel—might be either unfair or impractical and should not, therefore, be mandatory."

"If the object of the abandonment is to cut off the dead limb of a railway or if it is the total abandonment of a small system, as was true in the case of the Arlington & Fairfax Railway, as to which we had

I. C. C. Is Upheld in Northwest Oil Rates Case

The United States Supreme Court at its meeting on March 10 upheld, in a per curiam decision, a lower court ruling sustaining the Interstate Commerce Commission's decision in the I. & S. No. 4614 proceeding which dealt with the principal interstate rail and truck rates on petroleum and its products in the Mountain-Pacific Northwest.

During litigation of the case the railroads had contended that the minimum rate imposed upon them was higher than a compensatory rate and was calculated to hold an umbrella over their higher-cost competitors. The Commission's decision was reviewed in the *Railway Age* of October 7, 1939, page 533.

a part, it conceivably might be wholly unreasonable to add to the burden the further loss in requiring financial support of employees no longer needed. But if, on the other hand, the abandonment like consolidation tends to increase the earnings of the corporate applicant by avoiding unnecessary duplication of service from a particular area, but the substitution of bus for rail service and the general rearrangement of the properties and operations of the company, as the result of which both stockholders and the public will benefit, it is difficult to recognize any distinction between such a case and one of consolidation, except that the proceedings in the one case are required to be under section 1 (18-20) and the other under section 5(4) (b).

"In this view," concludes the court, "we are of the opinion that it is not permissible to lean too strongly on either the refusal of the commission for several years to assume the authority which we think it had or the omission of Congress in the recent passage of the Transportation Act to provide it. While it is true the commission under section 5 was acting in accordance with a general plan of consolidation which Congress then had in view, it is also true that under section 1 (20) it acts in accordance with the general policy of that plan, and if that policy includes the protection of employee morale with all its implications in the one case, it seems to us it necessarily must include it equally in the other. . . . That part of the commission's report which denies consideration of the employees' petition for lack of power will be set aside, with directions to the commission to consider the petition and take such action thereon as in the discretion of the commission is proper."

New York Central to Replace Boy's Pet Horse

R. M. Martz, a 13-year-old newsboy of Sutton, Pa., whose pet horse, Fred, was killed on January 11, when he got out of control and ran into a New York Central train, will get a "replacement." Last week, President F. E. Williamson sent a personal letter to the boy expressing regret over the

accident and promising that the road will provide him with a new horse for use in delivering his papers through the western Pennsylvania farm and mining country where he lives. Mr. Williamson sent the letter by a representative who assured the boy's parents that the road will assume medical and hospital expenses incurred in caring for the boy's injuries.

No Railroad Division

After considering the advisability of establishing a Railroad Division for more than a year, the American Society of Civil Engineers decided, at a recent meeting of its board of direction, that it was not advisable to take this action.

Stores Meeting in June

The General Committee of Div. VI—Purchases and Stores, A. A. R., at a meeting in Chicago on March 11, decided to hold the next annual convention of the association in Chicago during June, the hotel and exact dates of the meeting to be decided during the next few weeks.

Allegheny Shippers Board to Meet March 20

The Allegheny Regional Advisory Board will hold its 45th regular meeting at the William Penn Hotel, Pittsburgh, Pa., on March 20. H. C. Spillman of New York will be guest speaker at the luncheon, addressing the board on the subject "American Industry, the Arsenal of Democracy."

Water Carriers Apply for Exemption from Regulation

Applications of 153 water carriers for exemption from regulation under the Transportation Act of 1940 had been received and docketed by the Interstate Commerce Commission up to March 11. The commission has made public two lists of applicants, the docket numbers of the cases running from W-1 to W-153, inclusive.

To Broadcast from A. C. F. Plant

The National Broadcasting Company will originate a broadcast from the tank building plant of the American Car & Foundry Company at Berwick, Pa. from 7 to 7:30 p. m. today (March 15). During the program, Graham McNamee will interview Charles J. Hardy, president of the company, with respect to defense activities.

February Employment 3.5 Per Cent Above 1940

Railroad employment increased 1.12 per cent—from 1,018,306 to 1,029,710—during the one-month period from mid-January to mid-February, while the February total was 3.5 per cent above that for February, 1940, according to the Interstate Commerce Commission's compilation based on preliminary reports. The index number based on the 1935-1939 monthly average and adjusted for seasonal variation stood at 104.9 for February, as compared with January's 104 and February, 1940's 101.3.

February employment in all groups of employees was above both the previous month and February, 1940, the largest increase as compared with the latter being

the 5.05 per cent rise in the maintenance of equipment and stores group. Other increases as compared with the previous year ranged from 0.84 per cent in the group embracing executives, officials and staff assistants to 3.48 per cent in train and engine service. The increases as compared with January ranged from 0.35 per cent among executives, officials and staff assistants to 2.05 per cent in the maintenance of way and structures group.

N. Y. Railroad Club to Meet March 20

The New York Railroad Club will hold its next meeting on Thursday, March 20, in the Engineering Societies building, New York. The General Electric Company will present a program "Phenomena of Lightning." Added feature will be entertainment by Dr. H. L. Smith, the "dialect detective" of radio fame.

N. Y. Central Issues System-Wide Public Timetable of Freight Runs

The New York Central has issued an attractive 47-page timetable showing the schedules of through expedited freight trains on the system. This is the first time that a system-wide timetable of this character has been published by the road.

The booklet, which is being distributed to shippers and traffic managers throughout the United States, lists schedules of 175 daily fast freight trains on all roads of the system, including the Boston & Albany and the Pittsburgh & Lake Erie. The publication also contains a large map of the system, a complete list of freight and passenger agents and special service announcements.

I. C. C. Again Refuses to Discontinue General Rate Probe

The Interstate Commerce Commission has denied additional petitions for a discontinuance or indefinite postponement of its general investigations of the class rate structure, consolidated freight classification and the motor freight classification. The three proceedings are docketed, respectively, as No. 28300, 28310, and MC-C-150.

The petitions denied in the present order, dated March 3 and made public March 11, were those of the State of New York; the State of Michigan; the Steering Committee for State of Michigan; and the Detroit Board of Commerce. Also denied was New York's request that, if its prayer in the foregoing connection were not granted in full, the investigations "be narrowed to the smallest possible limits and no broad questions of general rate levels be considered."

Representation of Employees

Results of recent elections in representation-of-employees cases on several railroads have been announced by the National Mediation Board.

On the Florida East Coast, the Brotherhood of Locomotive Engineers by a vote of 67 to 56 beat the Brotherhood of Locomotive Firemen & Enginemen for the right to represent locomotive engineers. By a vote of 10 to 0 the yardmasters of the Northern Pacific Terminal Company of Oregon have chosen the Brotherhood of

Roads Get Certificate to Write Off Facilities in Five Years

Ten railroads were on the National Defense Advisory Commission list of 180 corporations which had received tax certificates of necessity from February 15 to February 28. The certificates are issued for the purpose of allowing companies providing facilities in connection with the defense program to take advantage of the special 60-month income tax amortization provided under section 124 of the Internal Revenue Code.

The ten railroads and the approximate cost of facilities certified in each case are as follows: Alabama Great Southern, \$86,000; Baltimore & Ohio, \$325,000; Cincinnati, New Orleans & Texas Pacific, \$173,000; Georgia, Southern & Florida, \$18,000; Lehigh Valley, \$2,317,000; Mississippi Central, \$150,000; Southern, \$715,000; Virginian, \$1,336,000; Wabash, \$49,000; Western Maryland, \$2,374,000.

Railroad Trainmen over the Railroad Yardmasters of America. On the New Orleans Terminal Company, the red caps designated the United Transport Service Employees of America, that organization winning a contest with the Brotherhood of Railway Clerks by a vote of 5 to 0.

Two cases where voting ended in ties were closed with certification; they involved the dining car stewards on the St. Louis-San Francisco and blacksmiths, their helpers and apprentices on the Texas & New Orleans. In the former case the Brotherhood of Railroad Trainmen and the Employee Representation Committee of the Dining Car Stewards of the St. Louis-San Francisco Railway Co. each received eight votes. In the Texas & New Orleans case the International Brotherhood of Blacksmiths, Drop Forgers & Helpers, operating through the Railway Employees' Department, American Federation of Labor, and the Association of Shop Craft Employees of the Southern Pacific Lines in Texas and Louisiana each received 53 votes.

A. A. R. Not Responsible for Eastern Steamship Cotton Embargo

M. J. Gormley executive assistant to the Association of American Railroads, has advised Representative Mansfield, Democrat of Texas, that the embargo placed upon the shipment of cotton between New York and New England by the Eastern Steamship Lines "is entirely an Eastern Steamship matter" wherein the A. A. R. "served merely to distribute these restrictions in the usual manner to all interested railroads and cooperating steamship lines."

The charge that the A. A. R. was "largely responsible" for the embargo was among others (noted in the *Railway Age* of March 8, page 437) made by Mr. Mansfield in a statement which he inserted into the March 3 issue of the Congressional Record. The Texan explained that his

authority was an item in a Galveston newspaper which he inserted into the March 10 record along with Mr. Gormley's letter. However, Mr. Mansfield said: "I assume, of course, that Mr. Gormley's letter gives the correct attitude of the Association of American Railroads with reference to this embargo."

Warning on Scrap Prices

A warning that a schedule of maximum prices for scrap iron and steel will presently be established at a rate below prices current in the scrap metal market was issued March 7 by Leon Henderson, Commissioner of Price Stabilization, National Defense Advisory Commission.

In response to inquiries from the Pacific Coast and other regions, the following statement was issued by Mr. Henderson: "A set of geographical and grade differentials has been submitted to all interested divisions of the industry, including foundries, scrap dealers and steel manufacturers, for criticism and discussion. After the Division has given due consideration to all of these criticisms and suggestions, there is no doubt that a schedule of maximum prices on grades at various points in the United States, including the Pacific Coast, will be established. All of these prices will be below \$20 a ton, Pittsburgh."

N. C. & St. L. Inaugurates Educational Program

An extensive educational program, which is a benefit to the company as well as to the workers themselves, has been inaugurated by the Nashville, Chattanooga & St. Louis under the direction of W. Way, Jr., who has been appointed to the newly created office of executive assistant. The program is based upon the premise, as outlined by Fitzgerald Hall, "that although many things are required to run a railroad well, nothing can take the place of manpower in the form of highly trained men and women who are interested in the individual and co-operative effort that brings success to the company for which they work."

The course, consisting of mail and class instruction, is available to all employees and is designed to encourage the expression of ideas as well as to familiarize employees with the function and the operation of the railroad. The initial phase of the program is divided into four sections, historical, corporate, organization and principles of transportation. Each section is subdivided into a series of lessons. Each lesson is to be printed and distributed by mail at intervals of two weeks. When each section has been thus covered, classes will be held at various points on the railroad. As a supplement to the course for employees, cooperative arrangements have been made with colleges and universities and printed copies of the lessons are sent to them so that students can secure fundamental data of railroad operation.

South African Railroad Chief Retires

T. H. Watermeyer, general manager of the South African Railways & Harbours since August, 1933, retired, effective February 13, at the age of 62. In the early

years of his career, Mr. Watermeyer served with a consulting engineering firm and engaged in construction work in England and Wales. He entered service with the Cape Government Railways as a junior assistant engineer and was placed in charge of construction of certain new lines. In subsequent years he had executive direction in grade reduction and other construction work. In 1917 he was transferred to maintenance activities, serving on various divisions of the system. In 1925 he severed connection with the Engineering department to take over the position of assistant general manager of the northern divisions of the system. He became assistant general manager (technical) in April, 1929, and general manager of the entire system in August, 1933. Mr. Watermeyer toured the United States in 1937.

The Canadian Roads in February

February combined gross earnings of the Canadian National and Canadian Pacific showed a substantial increase for the month compared with a year ago, being some \$4.7 millions, or 15.9 per cent greater at \$34,350,000 compared with \$29,636,000.

The February gross was, in fact, the highest for that month since 1929, when the total was \$37,944,000, the percentage of excess over gross in the intervening years for that particular month being substantially greater than that over 1940, with the single exception of 1930.

Compared with 1933, the depression low point, last month's gross was more than double the \$16,552,000 total for February in the former year.

February combined gross earnings were slightly below those for January, 1941, when the total was \$35,612,000 and the percentage of gain over the like month a year ago was also slightly lower, that in January, 1941, being 19.4 per cent.

U. P. Tests First of Two Latest Diesel Passenger Locomotives

The first of two Diesel-electric passenger locomotives which will be used on the new City of Los Angeles and City of San Francisco has been delivered by the builder, the Electro-Motive Corporation, and is being tested by the Union Pacific prior to the inauguration of the trains. Each of the locomotives consists of three separate units having two 1,000 hp. engines with a combined rating of 6,000 hp. The overall length of the three units is 209 ft. and the weight 945,000 lb. Among the new

features of the locomotives is an automatic water spray which sprinkles water on the wheels to keep them cool during brake applications on long grades.

One of the locomotives will be used on the City of Los Angeles of the Union Pacific-Chicago & North Western between Chicago and Los Angeles, Cal., and the other will be used on the City of San Francisco of the Union Pacific-Chicago & North Western-Southern Pacific between Chicago and San Francisco, Cal. Fifteen streamlined passenger train cars will be used on each of these trains, of which 28 will soon be delivered by the Pullman-Standard Car Manufacturing Company.

C. N. R. to Add Train to Halifax

The Canadian National will improve passenger service between Montreal, Que., and Halifax, N. S., by shortening the present running-time of the "Ocean Limited," making it an exclusively all-sleeping car train, and placing in service a complete new train to be called the "Scotian," effective March 16. The change is necessitated by a growing volume of passenger and head-end traffic to and from Canada's chief Atlantic port, occasioned by the country's war effort. For a considerable time it has been necessary to operate the "Ocean Limited" in extra sections.

The schedule change will clip 50 min. off the running time of the "Ocean Limited" from Montreal to Halifax and 1 hr., 20 min., from the present schedule westbound. The limited will leave Montreal daily at 7:30 p. m., 30 min. earlier than at present and arrive at Halifax at 8:10 p. m. next day. Westbound it will leave Halifax at 8:25 a. m., 20 min. earlier than at present, and arrive in Montreal at 6:50 a. m. A number of station stops will be eliminated.

The "Scotian" will run on the present schedule of the "Ocean Limited" and will carry coaches, sleeping cars and a colonist car. The schedule of the "Maritime Express" will also be modified somewhat; on Saturday it will operate between Montreal and Mont Joli, Que., only.

Rail-Boat Circle Tours to Nassau Offered

The Trunk Line and Southern Passenger Associations have issued joint passenger tariffs for circuit tours for rail and ocean travel at low round-trip rates between points along the eastern seaboard as far north as New York and Nassau,

Bahamas. The passenger may originate his journey at any point between Miami, Fla., and New York and pay the same base price of \$72 for the round trip in coaches or \$89.25 for tickets valid in Pullmans. Also the trip may be made in either direction.

Operated in connection with the Eastern Steamship Line and the Merchant & Miners Line, the circuit tour, which embraces the Seaboard Air Line, Atlantic Coast Line, Florida East Coast, Pennsylvania and Baltimore & Ohio, provides a rail journey between Miami and New York and intermediate points and a boat journey between New York and Nassau and between Miami and Nassau. The cruise liner "Evangeline," with first-class accommodations for 600 passengers, leaves New York at 3 p. m. every Saturday and arrives back in New York on Fridays. The liner "Berkshire" makes three round-trips between Miami and Nassau each week.

January Accident Statistics

The Interstate Commerce Commission on March 10 made public its Bureau of Statistics' preliminary summary of steam railway accidents for January. The tabulation, which is subject to revision, follows:

Item	Month of January	
	1941	1940
Number of train accidents.....	675	764
Number of casualties in train, train-service and nontrain accidents:		
Trespassers:		
Killed	112	99
Injured	116	98
Passengers on trains:		
(a) In train accidents*		
Killed	155	176
Injured	1	1
(b) In train-service accidents		
Killed	147	148
Injured	75	90
Travelers not on trains:		
Killed	54	70
Injured	1,621	1,881
Employees on duty:		
Killed	208	201
Injured	678	729
All other nontrespassers:**		
Killed	375	372
Injured	2,792	3,122

* Train accidents (mostly collisions and derailments) are distinguished from train-service accidents by the fact that the former cause damage of more than \$150 to railway property.

** Casualties to "Other nontrespassers" happen chiefly at highway grade crossings. Total highway grade-crossing casualties for all classes of persons, including both trespassers and nontrespassers, were as follows:

Persons:		
Killed	196	197
Injured	484	583

A. T. A. Protests R. E. A. Truck Activities

The American Trucking Associations, Inc., through its general counsel, J. Ninian Beall, has asked the Interstate Commerce Commission to refrain from granting the Railway Express Agency operating rights to perform motor carrier operations until it has decided on the meaning and scope of the term "express business." The petition further urges the commission not to grant any of the Agency's pending applications for rail-highway operations until it has determined "what restrictions and limitations should be applied in order to confine the Agency's operations to that class of business which may be found to be embraced in the term 'express business', as



The New Locomotives Are 209 ft. Long and Weigh 945,000 lbs.

distinguished from ordinary motor carrier business."

Mr. Beall, in his petition, charges that the railroads are seeking to enter the trucking business by use of the R. E. A., thus obtaining authority to operate over routes where they would ordinarily be barred. He further contends that the R. E. A. is asking for authority to extend its highway operations by carrying general commodities in addition to regular express business, thus increasing the competition with truckers. It would appear that the petition is broad enough to have the commission look into the whole question of the extent to which railroads through the R. E. A. and by their own operations may engage in highway transportation.

Western Lines Ask Mediation Board to Enter Vacations Case

The National Mediation Board was requested by the Western railways on March 8 to assume jurisdiction in the controversy over the 14 non-operating brotherhoods' demand for vacations with pay and the Western railroads' counter-proposal for decreases in rates of pay. This action follows the brotherhoods' rejection of the offer made by the Western railways on March 4, as reported in the *Railway Age* of March 8, page 435, to handle the controversy concertedly through negotiation.

"When the demands of the employees were first presented last May," J. A. Gillies, vice-chairman of the Conference Committee of the Western railways, explained, "conferences upon those demands and the counter proposals of the Western lines were held upon the individual railways. At that time the carriers offered to handle these matters concertedly in the West. That offer was never withdrawn and was repeated on March 4, with a definite date proposed for meeting. We have now been advised by the leaders of the affected employees that they will not meet with the Western railways as a group to discuss these matters."

During August and September, the individual Western railways were notified by their employees that the handling of the vacation demands had been transferred to national union officers. Until March 4, the Western carriers have received no official advice whatsoever of any action on the part of the unions to pursue this matter further. We have now been advised for the first time that conferences on the individual lines were terminated by the employees when the national labor organizations assumed jurisdiction, and we have also been advised that the union officers will not meet to discuss the controversy with this Committee representing the Western railways.

"As a result of this refusal upon the part of the employees, the Western railways have requested the services of the National Mediation Board, a Board set up by the Railway Labor Act to handle disputes between railroads and their employees."

Freight Car Loading

Loadings of revenue freight for the week ended March 8 totaled 741,922 cars, the Association of American Railroads announced on March 13. This was a de-

crease of 14,748 cars, or 1.9 per cent, below the preceding week, but an increase of 121,326 cars, or 19.5 per cent, above the same week in 1940, and an increase of 153,496 cars, or 26.1 per cent, over the comparable 1939 week.

As reported in last week's issue, the loadings for the previous week ended March 1, totaled 756,670 cars, and the summary for that week, as compiled by the Car Service Division, A. A. R., follows:

Revenue Freight Car Loading			
For Week Ended Saturday, March 1			
Districts	1941	1940	1939
Eastern	171,345	142,341	134,729
Allegheny	169,849	130,894	117,409
Poconchos	52,408	44,986	41,429
Southern	115,703	100,246	92,800
Northwestern	86,784	74,530	69,480
Central Western	105,970	94,805	95,204
Southwestern	54,611	46,834	43,373
Total Western Districts	247,365	216,169	208,057
Total All Roads	756,670	634,636	594,424
Commodities			
Grain and grain products	34,058	35,323	32,341
Live stock	10,506	11,131	9,636
Coal	160,307	130,500	125,027
Coke	14,244	10,030	7,414
Forest products	40,743	32,269	24,428
Ore	12,182	10,082	8,979
Merchandise l.c.l.	159,365	149,550	153,403
Miscellaneous	325,265	255,751	233,196
March 1	756,670	634,636	594,424
February 22	678,493	595,383	556,742
February 15	721,176	608,237	576,645
February 8	710,196	627,429	576,352
February 1	714,323	657,830	573,127
Cumulative Total, 9 Weeks	6,320,953	5,681,250	5,166,020

In Canada.—Carloadings for the week ended March 1 totaled 55,815 as against 54,168 in the previous week and 48,348 a year ago, according to the summary of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
March 1, 1941	55,815	30,037
February 22, 1941	54,168	28,801
February 15, 1941	55,106	29,114
March 2, 1940	48,348	24,965
Cumulative Totals for Canada:		
March 1, 1941	469,524	251,174
March 2, 1940	425,490	215,535
March 4, 1939	359,010	190,059

Plans to Smooth Flow of Rail Freight into Army Camps

The War Department announced on March 10 that plans have been completed by the Commercial Traffic Branch of the Quartermaster Corps to facilitate the movement into, around, and out of Army posts, camps and stations, the "many thousands of freight cars which will be needed to carry supplies and equipment for an Army of 1,418,000 men."

"To accomplish this task," the statement said, "it has been necessary to make up-to-the-minute surveys of operations and expedite deliveries of locomotives to 56 camps and greatly enlarged posts throughout the country. An appropriation of \$2,800,000 was made for the development of railroad facilities at these Army posts and a program has been prepared which considers the future expansion possibilities of the Army. For hauling freight at Army stations, the last of 60 modern locomotives will be delivered by September, at a cost of \$1,400,000. Ten of the locomotives will be Diesel-electrics, including two 100-ton locomotives, three 60-ton units and 10

45-ton engines. The other 45 locomotives are 20-ton gasoline mechanical types. Less than six months after the orders were placed, two of the 100-ton locomotives were in operation, hauling as much as 60 carloads of freight. These engines cost \$60,000 each. The three 60-ton Diesel-electric locomotives are to be delivered in June.

"During July the final tests are expected to be made on the 10 45-ton Diesel-electric locomotives, designed to haul trainloads of 15 to 25 cars. Starting in June, at the rate of two engines a week, the flow of the 45 'mosquito' or 20-ton locomotives, will start to Army camps, posts and stations all over the country. Examples of the problems which must be met include that at Fort Bragg in North Carolina, where about 5,000 cars will be handled each month; 20 cars a day are anticipated at Camp Blanding, Florida, where 50,000 troops will be encamped by June 15; and Camp Wolters, near Mineral Wells, Texas, will have 17,000 feet of railroad track and 16,000 officers and men to serve by June 15."

More Research on the Big Ditch

(Continued from page 489)

American Continent. Over this distance there would be only 67 miles of canals, eight miles of restricted channels, and 18 locks.

2. Though by no means as unencumbered as shipping on the high seas, yet the conditions of navigation on the St. Lawrence are not so difficult or hazardous as to make extensive utilization impossible.

3. The season of navigation, though restricted, is not so short, considering the length of revenue-producing operations permitted, as to make the St. Lawrence route unattractive to shipping lines.

4. There are, in normal times, enough ships of required draft to navigate a 27-ft. channel as proposed. In the light of the factors here cited, it can be confidentially expected that there will be enough ships able to navigate from the ocean to the Lakes to take care of available traffic.

Prompt endorsement of the report came from Representative Culin, Republican of New York, who inserted Dr. Danielian's letter of submittal into the appendix to the March 7 issue of the Congressional Record. By way of introduction, Mr. Culin said that "with the 'Ananias Club' organized by the railroads and other interests in full blast and financed by millions of dollars, it will be comforting to members of the House to know that a sound, reasonable approach to the economics of the St. Lawrence seaway is becoming available." The survey, as Mr. Culin sees it, is being conducted "by unpurchasable engineers and highly expert transportation economists," under the direction of Dr. Danielian, "an economist of first rank." Also, the New Yorker thought it worthy to note that "the United States Army engineers, who are without peers in the field of water transportation, Admiral Land, chairman of the Maritime Commission, and other public agencies, are cooperating in this endeavor

to present the facts concerning this great project to the public and the Congress."

The report was also mentioned by Representative Pittenger, Republican of Minnesota, who extended his remarks in the March 10 issue of the record to insert an editorial which the Minnesotan thought had dealt effectively with the seaway opponents' "foolish arguments intended to confuse and mislead the people." In the same issue Representative Shafer, Republican of Michigan, inserted a letter written by J. C. Beukema, secretary of the Muskegon Chamber of Commerce to William P. Frost, president of the Michigan Federation of Labor. Mr. Beukema had read with "disappointment and chagrin" of the Federation's opposition to the seaway; and suggested that the action be reconsidered to the extent of appointing a committee to study the problem "without prejudice." In addition to that mentioned above, Mr. Pittenger had inserted other statements in support of the seaway into the March 5 Record.

The aforementioned remarks of Representative Culin were answered in the March 11 Record in an extension-of-remarks by Representative Beiter, Democrat of New York, who called the Danielian survey "an affront to the pocketbooks of the American taxpayers." Mr. Beiter referred to past St. Lawrence reports and asked why it was necessary to go to the additional expense of making another, in view of the fact that "in 1934 the climax of these reports and investigations was reached" when the Senate refused to ratify the treaty between the United States and Canada. Recalling Mr. Culin's reference to the "Ananias Club," Mr. Beiter pointed out that his colleague had made no refer-

ence to "the millions of dollars which the United States government has set aside for these reports"; also, Mr. Culin "glibly passes over the point that the funds to pay for these expensive investigations come from the taxpayers and farmers, who, in turn, are the very people who would be losers through the construction of such a seaway." In Mr. Beiter's opinion, the St. Lawrence project "by no stretch of the imagination can be called a defense measure"; and "the transfer of money and men from defense works to such a fly-by-night proposal is not to be permitted in these extenuating times."

In the same issue of the Record there were other statements in opposition to the seaway inserted by Representative Rodgers, Republican of Pennsylvania, and Representative Schwert, Democrat of New York. Representative Dondero, Republican of Michigan, inserted a letter in favor of the seaway which he had received from Mayor Carl F. Zeidler of Milwaukee, Wis.

Transport 12½ Thousand N. E. Guardsmen to Florida

One of the heaviest railroad movements of troops and their impedimenta since mobilization of the National Guard last year began on March 7 when the 43rd division of the National Guard, comprising units from the states of Connecticut, New Hampshire, Maine, Rhode Island and Vermont, began its long journey from home armories to Camp Blanding, Fla. A total of 12,524 officers and men are to be transported during the period March 7 to March 18, inclusive, for which movement a total of 42 special trains, consisting of 595 baggage, kitchen and tourist-sleeper Pullman cars are being provided. In connection

with this movement the railroads are also hauling 2,283 tons of baggage and military equipment, including a number of pieces of field artillery and tractors.

Included in each train are one or two "kitchen cars," in reality, baggage cars specially equipped with cooking facilities. The army commissary has installed two regular field kitchens in each car, one at each end, resting on wooden frames filled with sand. The familiar chimneys of these kitchens are afforded an outlet through roof ventilators.

Camp Blanding is served by the rails of the Southern and the Seaboard Air Line, but some of the movements south of Washington, D. C., are being made over the Atlantic Coast Line as far as Lake Butler, Fla., and the Southern beyond. Three routes are being used through Trunk line territory; one via Hell Gate bridge and New York City; another via the West Shore and Claremont junction, N. J., and the third via Wilkes-Barre, Pa. Two trains routed via the latter route are scheduled to run over the Central of New Jersey and the Lehigh Valley, respectively, to Bethlehem, Pa., thence over the Reading and Baltimore & Ohio.

Certain units of guardsmen originating in points off main routes are carried on regular trains or railroad-affiliated buses to connect with the special trains. Thus, for example, troops from Pawtucket, R. I., used scheduled trains to connect with their special at near-by Providence. The table gives a complete schedule of special trains.

Transportation of Turbine Parts Presents Interesting Problems

The transportation of four power plant parts from Eddystone, Pa., to Boulder

ADVANCE DETACHMENT

Train No.	Cars	Origin	Leave	Arrive	Route
1	14	Hartford, Conn.	Mar. 7—12:15 a.m.	Mar. 9—7 a.m.	NH, PRR, RF&P, SAL
2	13	Torrington, Conn.	Mar. 8—1 a.m.	Mar. 9—9 a.m.	NH, PRR, RF&P, SAL
3	10	Norwich, Conn.	Mar. 8—5 p.m.	Mar. 10—7 a.m.	NH, PRR, So.
4	14	Providence, R. I.	Mar. 7—6:15 p.m.	Mar. 9—11 a.m.	NH, PRR, So.
5	13	White River Jct.	Mar. 7—8 p.m.	Mar. 9—1 p.m.	B&M, NYC, B&O, RF&P, SAL
6	16	Portland, Me.	Mar. 7—1:30 p.m.	Mar. 9—3:30 p.m.	B&M, NYC, B&O, RF&P, ACL, So.
7	10	Manchester, N. H.	Mar. 8—9 a.m.	Mar. 10—9 a.m.	B&M, NYC, B&O, So.

REGULAR DETACHMENT

1	10	Danielson, Conn.	Mar. 10—11:15 p.m.	Mar. 12—7 a.m.	NH, PRR, RF&P, ACL, So.
2	16	Hartford, Conn.	Mar. 11—1:10 a.m.	Mar. 12—9 a.m.	NH, PRR, RF&P, SAL
3	16	Providence, R. I.	Mar. 11—12:45 a.m.	Mar. 12—11 a.m.	NH, PRR, RF&P, SAL
4	12	Providence, R. I.	Mar. 10—11:10 p.m.	Mar. 12—1 a.m.	NH, PRR, So.
5	10	Providence, R. I.	Mar. 11—2:30 a.m.	Mar. 12—3 p.m.	NH, PRR, So., ACL, So.
6	13	Portland, Me.	Mar. 11—1 p.m.	Mar. 13—7 a.m.	B&M, NYC, B&O, RF&P, ACL, So.
7	15	Portland, Me.	Mar. 11—10:45 a.m.	Mar. 13—9 a.m.	B&M, NYC, B&O, RF&P, SAL
8	17	Portland, Me.	Mar. 11—6 a.m.	Mar. 13—11 a.m.	B&M, NYC, B&O, RF&P, So.
9	14	Portland, Me.	Mar. 11—3:15 p.m.	Mar. 13—1 p.m.	B&M, NYC, B&O, RF&P, SAL
10	8	Barre, Vt.	Mar. 11—3:30 p.m.	Mar. 13—3 p.m.	CV, B&M, D&H, PRR, RF&P, SAL
10-A	15	Manchester, N. H.	Mar. 10—5:45 p.m.	Mar. 13—5 a.m.	B&M, NYC, B&O, RF&P, SAL
10-B	15	Manchester, N. H.	Mar. 11—11 p.m.	Mar. 13—5 p.m.	B&M, NYC, B&O, RF&P, SAL
11	14	Rutland, Vt.	Mar. 12—7:35 a.m.	Mar. 14—7 a.m.	Rut., B&M, NYC, B&O, So.
12	14	St. Albans, Vt.	Mar. 12—12:10 a.m.	Mar. 14—9 a.m.	CV, B&M, NYC, B&O, RF&P, ACL, So.
13	14	Burlington, Vt.	Mar. 12—6:35 p.m.	Mar. 14—11 a.m.	Rut., B&M, NYC, B&O, RF&P, SAL
14	14	Newport, Vt.	Mar. 12—9:15 a.m.	Mar. 14—1 p.m.	CP, B&M, D&H, CNJ, Rdg., B&O, RF&P, SAL
15	17	Windsor, Vt.	Mar. 12—9:10 a.m.	Mar. 14—3:45 p.m.	B&M, D&H, LV, Rdg., B&O, So.
16	13	New London, Conn.	Mar. 14—1:25 a.m.	Mar. 15—7 a.m.	NH, PRR, RF&P, SAL
17	16	New Haven, Conn.	Mar. 13—10:10 p.m.	Mar. 15—9 a.m.	NH, PRR, So., ACL, So.
18	17	Waterbury, Conn.	Mar. 13—7:55 p.m.	Mar. 15—11 a.m.	NH, PRR, So.
19	15	Torrington, Conn.	Mar. 14—6:05 a.m.	Mar. 15—1 p.m.	NH, PRR, RF&P, SAL
20	13	Manchester, Conn.	Mar. 14—8:35 a.m.	Mar. 15—2:30 p.m.	NH, PRR, RF&P, ACL, So.
21	17	Middletown, Conn.	Mar. 14—2:30 p.m.	Mar. 16—7 a.m.	NH, PRR, So.
22	15	Hartford, Conn.	Mar. 15—2:25 a.m.	Mar. 16—9 a.m.	NH, PRR, RF&P, SAL
23	15	Willimantic, Conn.	Mar. 15—4:45 a.m.	Mar. 16—11 a.m.	NH, PRR, RF&P, ACL, So.
24	15	New Britain, Conn.	Mar. 15—6:10 a.m.	Mar. 16—1 p.m.	NH, PRR, RF&P, SAL
25	13	Hartford, Conn.	Mar. 15—11:50 a.m.	Mar. 16—3 p.m.	NH, PRR, RF&P, SAL
26	16	Providence, R. I.	Mar. 15—11 p.m.	Mar. 17—7 a.m.	NH, PRR, RF&P, SAL
27	9	Providence, R. I.	Mar. 15—2:35 a.m.	Mar. 17—9 a.m.	NH, PRR, RF&P, SAL
28	10	Bangor, Me.	Mar. 15—4:45 a.m.	Mar. 17—11 a.m.	Me.C, B&M, NYC, B&O, So.
29	11	Bangor, Me.	Mar. 15—8 a.m.	Mar. 17—1 p.m.	Me.C, B&M, NYC, B&O, So.
30	12	Bangor, Me.	Mar. 15—3:15 p.m.	Mar. 17—3 p.m.	Me.C, B&M, NYC, B&O, RF&P, SAL
31	11	Norwich, Conn.	Mar. 17—12:30 a.m.	Mar. 18—7 a.m.	NH, PRR, RF&P, SAL
32	11	Danbury, Conn.	Mar. 16—8:55 p.m.	Mar. 18—9 a.m.	NH, PRR, So.
33	12	Stamford, Conn.	Mar. 17—8:35 a.m.	Mar. 18—11 a.m.	NH, PRR, RF&P, SAL

Dam, Nev., between February 22 and March 7, presented several interesting problems that were solved by the Pennsylvania; the Elgin, Joliet & Eastern; the Chicago & North Western and the Union Pacific, which handled the shipment. The parts, from left to right in the accompanying picture, are a horseshoe-shaped forging 12 ft. long, 14 ft. high and nearly 12 ft. in diameter; a 9-ft. section of steel tubing, 10 ft. in diameter, to which is attached an 11-ft. section that is 4 ft. in diameter; a lower head cover, 18 ft. in diameter and weighing 80,000 lb., and an upper head cover, 18 ft. in diameter and weighing 60,000 lb.

The first problem to be solved was that of loading the 18-ft. parts with a minimum clearance. To accomplish this, a special loading arrangement was devised so that the covers could be tilted and extended below the floor of the car. This device consisted of four 8-in. beams placed across the car above and under the side frames, to which they were bolted, and an A-frame of 8-in. timbers erected above the car floor. These members carried the weight of the covers. In addition, tie rods held the covers in place. With this arrangement, the covers extended only 14 ft. above the car floor and 17½ ft. above the rails.

Although this method held the clearance to 17½ ft., the shipment would not clear all overhead obstacles and circuitous routings of the cars had to be planned. The Pennsylvania moved the cars from Eddystone, Pa., to Hobart, Ind., via Wilmington, Del., Perryville, Md., Harrisburg, Pa., Williamsport, Erie, New Castle and Crestline, Ohio. The Elgin, Joliet & Eastern routed the cars from Hobart around the industrial section of Chicago to West Chicago, and the Chicago & North Western handled them on its main line from West Chicago to Council Bluffs, Iowa. The Aspen Tunnel east of Ogden, Utah, on the Union Pacific would not accommodate a shipment of this height so the U. P. had to route the cars from Council Bluffs to

McCammon, Idaho and thence to Boulder Dam.

The top-heavy nature of the load was another problem to be considered. To insure safe handling, the cars were moved in local service with a speed restriction of 25 m. p. h. The circuitous routing, the speed restriction and the waits for local trains account for the time enroute.

TNEC "Experts" Scold RRs Again

(Continued from page 490)

numerous and expensive did these organizations become that the president of at least one railroad, the late F. W. Sargent of the Chicago & North Western, wrote to the president of the A. A. R. in 1935 protesting against them. Mr. Sargent is quoted as saying that "We are getting so many new organizations and the assessments and fees are so numerous that the burden is becoming a material one."

It is further asserted that in Washington the pressure generated by these subsidiary organizations, as well as public opinion generally, is concentrated on Congress and the administrative arm of the government. The A. A. R., it continues, sees to it that the views of the railroads are presented to the various committees of Congress.

However, declares the monograph, "the presentation does not stop at that point. A continuous effort is made to back up the presentation with strong support. Literature is distributed to members of Congress and to influential citizens throughout the country. State railroad associations are maintained which concern themselves with both state and national legislation. The national association in Washington is in close touch with the state associations, furnishing them with literature and in a way directing their activities, particularly in national matters. The principal objec-

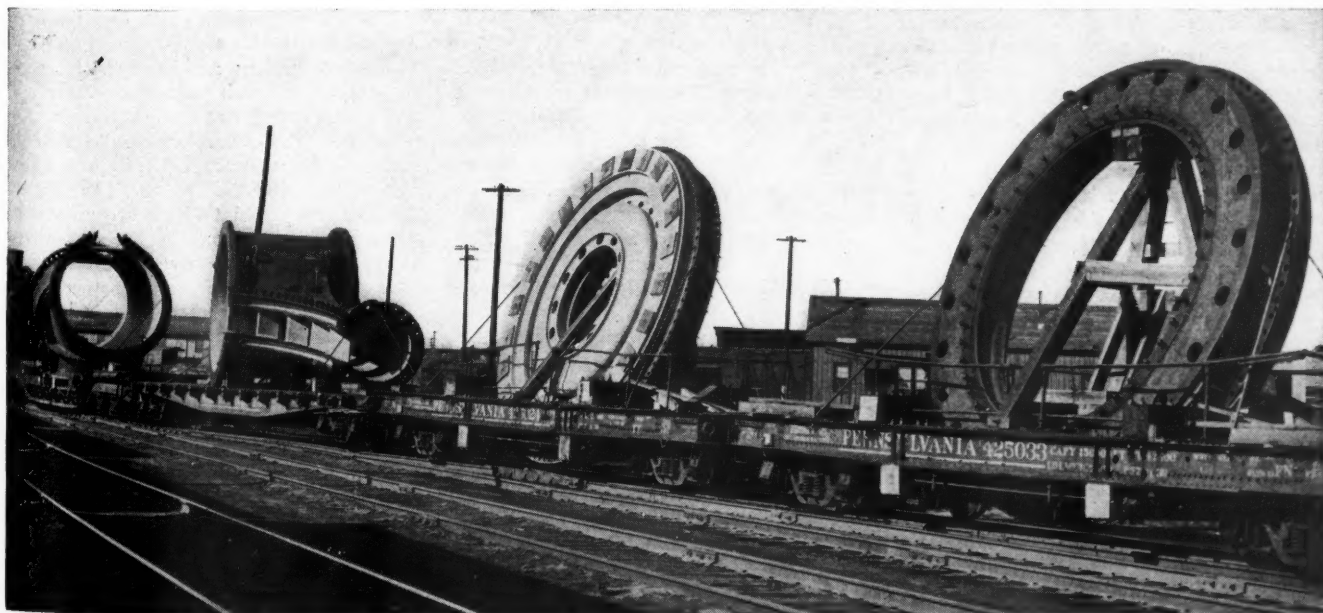
tive of this impressive activity is the enactment of legislation regulating the railroads' competitors in the same degree as the railroads, an objective which seems to have been achieved."

The monograph also contains several paragraphs outlining the findings of the Wheeler railroad investigating committee of several seasons ago. These findings deal with allegations of banker domination of railroads, control of large properties with small investments, holding company control, and flouting of state and federal laws in the control of railroad companies.

As compared with the successful A. A. R. campaign for the regulation of its competitors, the authors of the monograph feel that the railroad association's daily contacts with the Interstate Commerce Commission "are almost prosaic." It is also observed that many other organizations exert pressure on the commission and that in the decade 1922-32 no less than 37 different proposals were laid before Congress by labor unions, business organizations, and farm and livestock associations asking for legislation regarding the commission.

"The organized railways and shippers," comments the monograph, "have not regarded such activities with favor." The authors then quote E. P. Herring in his book, "Public Administration and the Public Interest," to the effect that "On the whole, the force of both the organized carriers and the organized shippers have been exerted to counteract legislative interference in rate making and to combat undue influence by sectional interests."

The only comment that the monograph has to make regarding the railroads' relationship with labor is that the right of railway labor to organize and to bargain collectively with management is generally recognized by the A. A. R., "subject to the usual proviso of management that this right should not be exercised in such a way as to result in the closed shop." There then follows a short history of labor's



The Top-Heavy Nature of the Parts Required Careful Handling Enroute

successful efforts to legislative shorter hours, mediation of disputes, and pensions.

After pointing out that railroad employment and pay rolls have been steadily declining since 1920, the second monograph on social performance goes on to say that throughout this period there has been an increasing tendency for employment and pay rolls to lag behind production, particularly in recent years. "This, as is well known," continues the monograph, "has been due to a whole series of technological improvements, no one of which might be called truly revolutionary in character but with a cumulative character that is epoch making."

"In 1937 the volume of traffic was about 85 per cent of what it had been in the period from 1923 to 1925 but employment had gone down by more than one-third," declare the authors. "Moreover, the industry has been steadily decreasing its rates so that the exchange value of railway services has on the whole fallen more rapidly than production. Pay rolls have also suffered, though for the most part they have kept pace with the volume of consumer dollars paid out for railway services."

"Outstanding is the rapid increase in dividends and interest from 1919 to 1927 at a time when pay rolls were declining and production was barely holding even. Also outstanding is the fact that in the years 1930 and 1931 dividends and interests tended to maintain themselves at a high level. Only in the last year or so have they come down in line with pay rolls. In sum, from a position in 1919 substantially below pay rolls, dividends and interest began to diverge in 1924 and have been maintained by wide margins above the level of pay rolls until 1938."

"Extraordinary efforts have been made by railway managements to continue making interest payments. Too small a percentage of the dollars which they collected from the public were made available for the improvements and betterments necessary to maintain competitive position. In short, instead of writing obsolete capital off the books—capital made obsolete, it should be said, by the development of newer methods of transportation, the industry has written employment and pay rolls off the books but handicapped itself in its competitive struggle by heavy fixed charges."

After pointing out that the railroad industry is regulated as is the electric light and power industry, the monograph declares that "actual performance here so well meets the tests of consumption and production that had all industry performed as fully as the light and power industry, per capita production and employment today would be some 10 per cent larger than in any previous year in our industrial history. Protest against governmental regulation does not seem to correlate highly with actual damage to the economy."

At another point in the second monograph Professor Kreps is critical of the use by the Reconstruction Finance Corporation of public funds to keep certain railroads from going bankrupt. "As I have said on a previous occasion," writes Dr. Kreps, "Due to a tragically mistaken policy taxpayer funds were even doled out

by the billion in order to keep inflated capital structures from being put through the wringer.' The first public moneys spent by the R. F. C. were those which went to the relief of railroad bondholders. How great a deterrent to prosperity this mistaken policy has been can scarcely be guessed. The capital load and the resultant fixed charges form a considerable incubus on productive enterprise. Needless to say, the debt load which the courts have tried to validate into the public-utility price structure is an uneconomic subsidy to capital. Only by government interference and by threatening managers with displacement through bankruptcy proceedings would the managers of the railroads ever have maintained dividends and interest payments at the inflated level which has existed since 1925. Such governmental interference with economic processes should be removed. Capital should receive only what it earns, what it is worth economically."

"In view of the enormous amount of excess savings in recent years the price of capital is bound to be low just the way the price of potatoes is low when the harvest of potatoes is abundant. Yet the railroads and the utilities have not been allowed to take advantage of this economic fact. Judges still talk of six, seven, and eight per cent as a 'fair' rate of return in an age when the market price of savings is less than three per cent. The high rates not only fail to produce net revenue but cause unemployment and loss of traffic. Until the interest burden, that is, until the debt load in the railroad and utility industries is brought down to a sound and healthy basis, there may not be sound and healthy recovery in those industries."

In the meantime, Chairman O'Mahoney of the T. N. E. C. has placed in the record of the committee's hearings a statement of the recommendations which he hopes to see the committee make. They are as follows:

1. National charters for national corporations, in order that these agencies may have a definite and a free place in our economy and local business may be differentiated and protected from national business.

2. The effective and thorough enforcement of the anti-trust laws to maintain competition and to prevent all combinations and agreements that destroy business.

3. The encouragement of new business and small enterprise by revision of the tax laws for the purpose of encouraging new employment and new industry.

4. A national conference called by Congress of the various organizations, representative of business, labor, agriculture and consumers which have for years been working on diverse phases of this central problem might concentrate public thought and action on the objectives on which there is general agreement instead of, as now, on the objectives concerning which there is only misunderstanding, suspicion and disagreement.

House Committee Hearings on Lea Forwarder Bill

The Interstate Commerce Commission on March 13 announced a further postponement from March 16 until July

1 of the effective date of its outstanding orders which require discontinuance of joint rate arrangements between forwarders and motor carriers.

Hearings before the House committee on interstate and foreign commerce were under way this week on H. R. 3684, the forwarder-regulation bill introduced last week by Chairman Lea, while the Senate committee on interstate commerce on March 12 voted to report favorably an amended version of S. 210, the forwarder-regulation bill introduced recently by Senator Reed, Republican of Kansas, on behalf of himself and Chairman Wheeler of the committee.

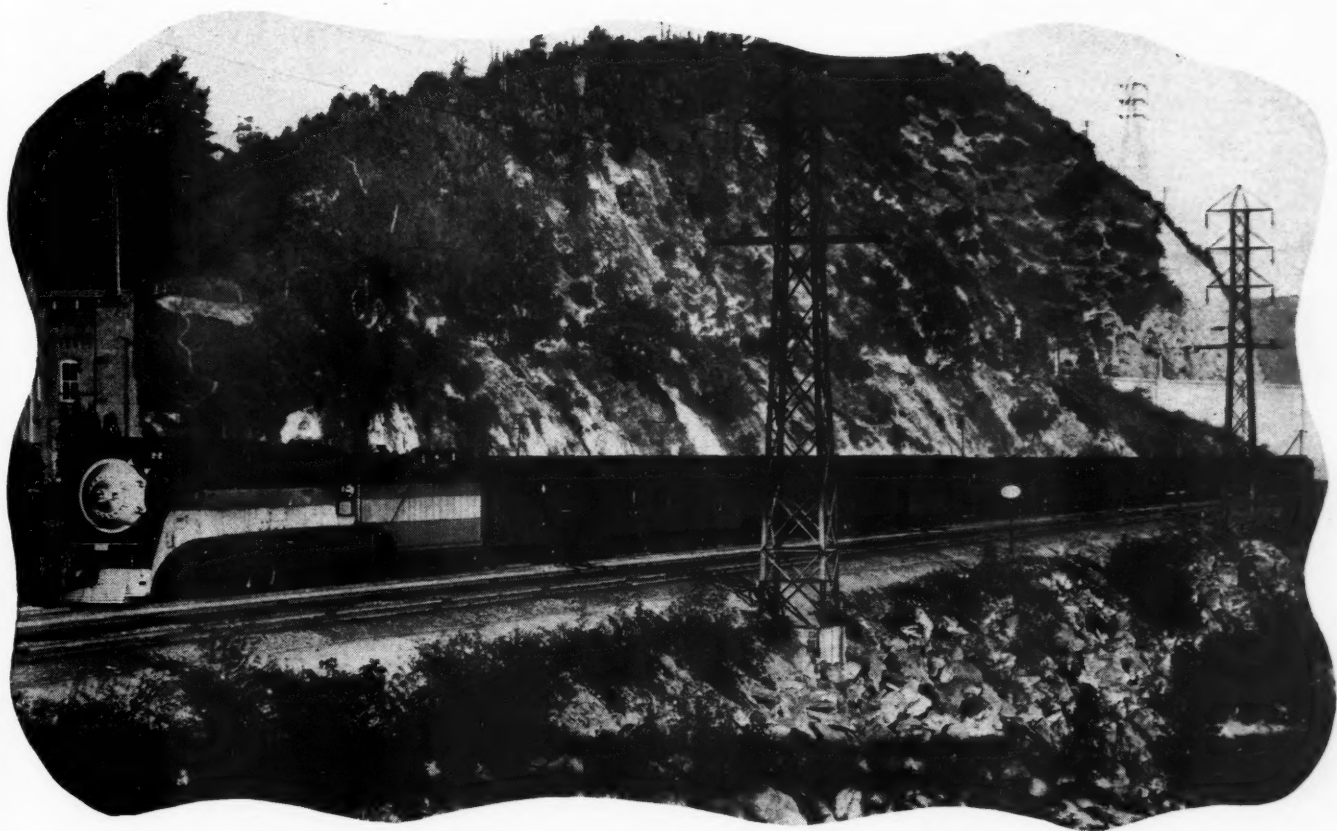
Meanwhile the forwarders were facing the March 16 deadline, when outstanding Interstate Commerce Commission orders requiring the discontinuance of joint-rate arrangements with motor carriers were scheduled to become effective. They had petitioned the commission for a further postponement; but in that connection they were up against the fact that the latest delay, from February 28 until March 16, was an eleventh-hour reprieve granted "in order that the changes required by said orders may be made with the least possible disruption of industry and inconvenience to the shipping public."

Provisions of the aforementioned Lea bill were outlined in the *Railway Age* of March 8, page 431, and the hearings on it opened March 12 with the testimony of Robert E. Quirk, counsel for the Freight Consolidators & Forwarders Institute. He was followed by W. J. H. McEntee, vice-president and treasurer of Acme Fast Freight, Inc., who also appeared on behalf of the Institute. Generally Mr. Quirk addressed himself to the proposition that forwarders, being common carriers at common law, should be recognized and regulated by the transportation regulatory statutes; while Mr. McEntee explained the forwarder method of handling freight and discussed specific provisions of the bill.

Questions from the committee members indicated their interest in the authority forwarders would obtain to enter joint-rate arrangements with the carriers whose services they utilize; and upon the freedom or lack of it which would be left to railroads and other carriers to conduct forwarding operations. After considerable discussion of the latter with Representative Wolverton, Republican of New Jersey, Mr. McEntee told that questioner that he (Mr. McEntee) would not object to including in the bill a provision which would permit railroads, express companies, water carriers, and motor carriers to engage in freight-forwarding operations without making application for or obtaining a certificate. The witness expressed the view, however, that such a provision would be "absolutely meaningless" and inconsistent with the bill's definition of a forwarder; also, that it would be "tautological" in that the carriers listed could now adopt the forwarder method of handling freight if they so desired.

As for the joint-rate matter, Mr. McEntee asserted that the forwarders without such arrangements with motor carriers could not afford to continue serv-

Lost L-C-L Freight Could be Regained by the Railroads **IF**...



IF all railroads were to install the "Hotshot" type of freight service comparable to that of The Southern Pacific and other progressive railroads, most of the freight lost to other types of carriers could be reclaimed. This has been proved by the fact that by last year "Hotshots" had lured back more than 600,000 tons of freight that the railroads had thought irretrievably lost.

The secret of the "Hotshot" is speed—Speed that can only be realized by using high-speed locomotives of the type in service on The Southern Pacific. These locomotives are used on both the crack "Daylight" passenger trains and on the equally fast "Overnight Hotshots". Install a fleet of Lima high-speed locomotives on your freight runs and regain your share of l-c-l freight.

LIMA LOCOMOTIVE WORKS



INCORPORATED, LIMA, OHIO

ing small communities where 50 to 65 per cent of their business is now found. Or, as Mr. Quirk put it, the forwarders would be forced back into the role of big-terminal operators where they started. Mr. Quirk had previously explained that it was only the antagonistic attitude of the railroads in the early days of forwarding that forced the forwarder into his shipper role. Now, he said, "practically every railroad in the United States appreciates the forwarder, except the Pennsylvania and, perhaps, the Baltimore & Ohio." At another point when he expressed the view that the forwarder is not a competitor of the railroads, Mr. Quirk added that "the railroads on the whole think the forwarder is a great institution."

In his statement explaining the forwarder method, Mr. McEntee likened forwarder services to those of the express companies and the U. S. Parcel Post. The annual business of the 20 forwarders who are members of the institute "exceeds \$135,000,000 in about 31,000,000 individual shipments." About 60,000 patrons "use forwarder service with regularity and at frequent intervals, many other thousands use forwarder service with less regularity, and many others use it occasionally." Emphasizing the "importance of forwarder traffic to rail carriers," Mr. McEntee said that the revenue from it ranked thirteenth in the freight commodity statistics; and fifth in Group 5, Manufactures and Miscellaneous. Acme pays about 62 cents out of every dollar of its gross to rail carriers, and Mr. McEntee thought that would be typical of other forwarder payments.

Continuing, the Acme vice-president discussed the aforementioned relationship of forwarders to motor carriers, explaining the condemned joint-rate and division arrangements. The forwarder traffic handled by motor carriers under such arrangements, Mr. McEntee said, is not like the local traffic of the truckers involved, being "essentially long-haul traffic." Moreover, "all evidence to date . . . indicates that the compensatory nature of the divisions is satisfactory to the motor carriers concerned." Arguing on the need for regulation of forwarders, the witness cited past pronouncements of the I. C. C. in that connection and then got into his plea for regulation in order that the joint-rate arrangements which permit service to small communities may be preserved. Unless there is relief in that connection "the forwarder will be compelled to curtail his services to the outlying points, or cancel them entirely; the cash losses make that inevitable."

Finally, Mr. McEntee's statement embodied a review and discussion of the provisions of the Lea bill. As noted in last week's issue this bill has the approval of the forwarders who would perhaps oppose certain features of the more stringent Wheeler-Reed bill—the aforementioned S. 210 which the Senate committee on interstate commerce has voted to report. In announcing its March 12 action in the latter connection, the committee did not indicate the nature of the amendments agreed upon, except to call them perfecting amendments. They will be worked out by Chairman Wheeler and Senator Reed.

Supply Trade

Westinghouse Electric & Manufacturing Co. Annual Report

The Westinghouse Electric & Manufacturing Co. reports net income for the year ended December 31, 1940, of \$18,985,429 which compares with \$13,854,365 in 1939, an increase of 37 per cent. Dividends totaling \$12,688,408 were paid during the year, or \$4.75 per share of preferred and common stock.

The company experienced during the year 1940 the greatest expansion in business in its fifty-five years of existence. New records were made in volume of incoming orders, amount of sales billed and the value of unfilled orders. Orders received during 1940 amounted to \$400,477,724 compared with \$214,239,044 in 1939, an increase of 87 per cent. This compares with orders of \$240,220,555 in 1929, the highest preceding year. Approximately 40 per cent of the 1940 business was orders in connection with the national defense program. Net sales billed totaled \$239,431,447 compared with \$175,071,363 in 1939, an increase of 37 per cent. Net sales billed included approximately \$21,000,000 in national defense equipment delivered during 1940. Unfilled orders at December 31, 1940, were \$223,685,737 compared with \$70,821,960 at the end of 1939. Approximately \$156,000,000 of unfilled orders are for the national defense program.

The Allegheny Steel Corporation has opened a modern warehouse and offices at 4915 Pacific boulevard, Los Angeles, Cal.

Iron & Steel Products, Inc., Chicago, has opened a branch office in Washington, D. C., with Ernest W. Smoot in charge as vice-president.

Robert Watson, formerly western sales manager, locomotive equipment division, of Manning, Maxwell & Moore, has been appointed western sales manager of the Waugh Equipment Company with offices in Chicago. Mr. Watson was associated with the American Locomotive Company from 1923 to 1926 at which time he joined the mechanical department of the Erie. In 1929 he was appointed mechanical engineer of the Firebar Corporation and continued in that capacity for six years after its merger with the Waugh Equipment Company in 1932.

The Chipman Chemical Company, Inc., Bound Brook, N. J., has constructed a plant at Portland, Ore., for the preparation of weed killing chemicals. Keith Sime has been appointed northwest representative, with headquarters at Portland. This new plant has for its source of sodium chlorate and other chlorate products, the chemical manufacturing plant of the Pennsylvania Salt Manufacturing Company, which was built to take advantage of the power from Bonneville Dam. The new Chipman plant will supply railroads in the northwest.

James G. Blunt, whose recent appointment as assistant to the vice-president in charge of engineering of the American

Locomotive Company was reported in the *Railway Age* of March 8, was graduated with a degree in mechanical engineering from the University of Michigan in 1894. During his early business career he was employed as a machinist at the



James G. Blunt

Buda Company, Harvey, Ill.; draftsman at the Welland Iron Works, Welland, Ont., and draftsman at the Bucyrus Company and the Industrial Works, Bay City, Mich. In 1897 he took a position as draftsman with the Brooks Locomotive Works at Dunkirk, N. Y., becoming chief draftsman in 1899. In 1906, following the formation of the American Locomotive Company, of which the Brooks Locomotive Works became a part, he was transferred to Schenectady, N. Y., and appointed engineer of the drafting department. In 1916 he became mechanical engineer and in 1936 chief mechanical engineer, which position he held until his recent appointment. In 1923 Mr. Blunt was vice-chairman of the A. S. M. E., Schenectady division.

Sherman Miller, whose appointment as chief mechanical engineer of the American

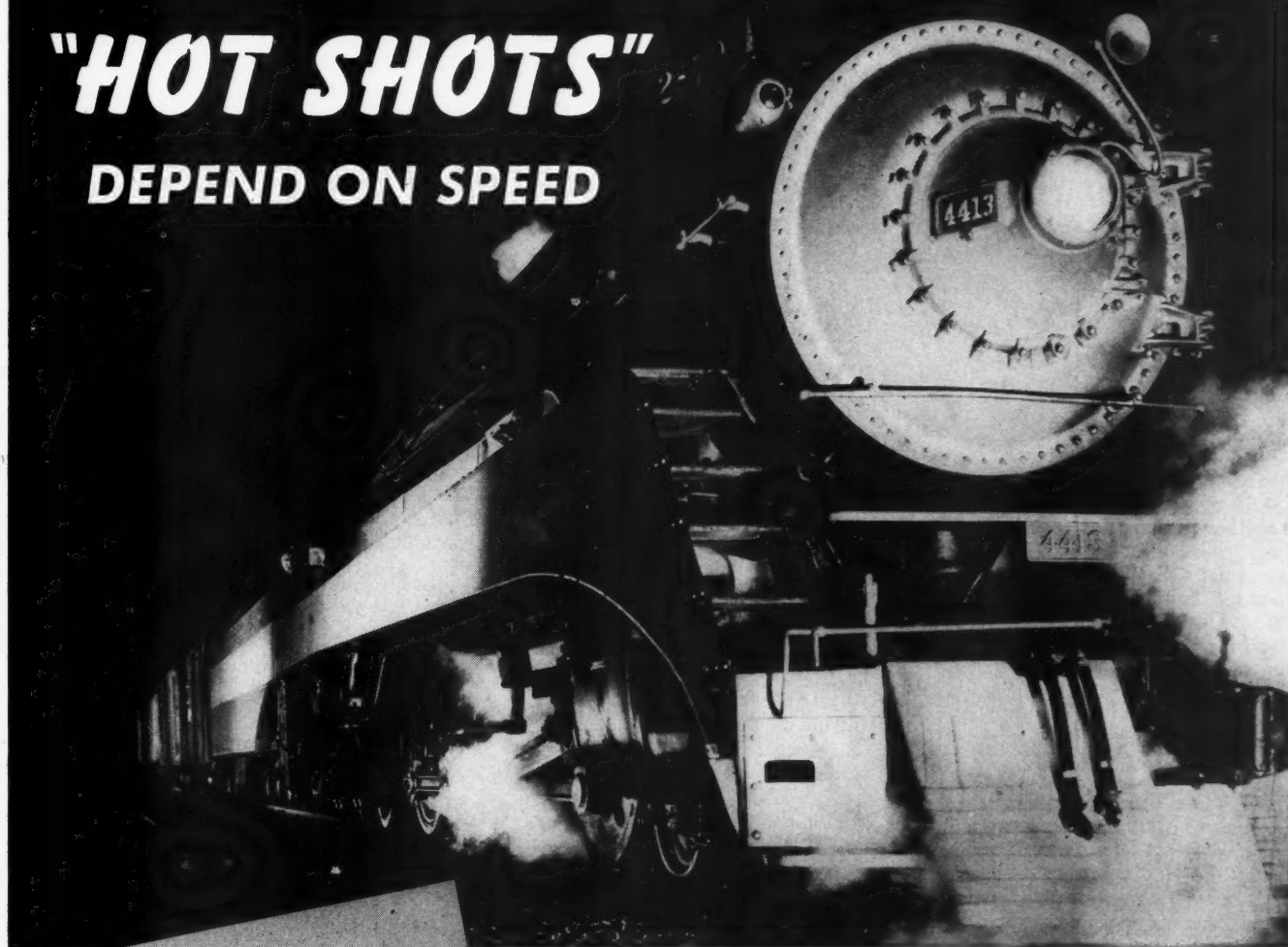


Sherman Miller

Locomotive Company was also reported in the *Railway Age* of March 8, began his business career, after leaving high school, in the erecting shop of the Brooks Locomotive Works and four years later was transferred to the drawing room. After attending Purdue University, class of 1905, mechanical engineering, he returned to the Brooks Locomotive Works and in 1907

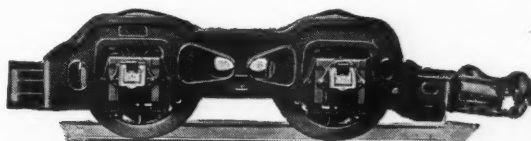
"HOT SHOTS"

DEPEND ON SPEED



THE
BOOSTER
Gives it
where it is
needed most
...IN STARTING

Last year the railroads lured back more than 600,000 tons of freight. This was made possible by the inauguration of "Hot Shot" freight trains that equal, if not better, passenger train running time. » » » To meet these rigid time schedules, progressive railroads such as the Southern Pacific, are using high-speed, booster-equipped passenger locomotives. The Booster gives these locomotives, which are limited by the load they can start, the added power to get larger pay-loads rolling. As speed drops on a grade the engineer can cut-in the Booster which gives added tractive effort until the locomotive reaches normal running speed again. » » » Install Locomotive Boosters on new or old power and get the added starting tractive effort so necessary in meeting "Hot Shot" time schedules.



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FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK
CHICAGO
MONTREAL

March 15, 1941

was appointed assistant chief draftsman. In July of that year he was transferred to Schenectady, N. Y., where the general drawing room of the American Locomotive Company was being organized, and in 1916 became superintendent of the general drawing room which position he held until his recent appointment.

Equipment and Supplies

So. Pac. Spends Over \$20,000,000 for Equipment

One of the outstanding orders for steam locomotive power in a long span of years from the standpoint of the number and the size of the locomotives has been placed by the Southern Pacific with the purchase of 50 large units including 40 of the road's cab-ahead engines, among the heaviest and most powerful in the world, and 10 streamlined units of the Daylight type. The estimated cost of the engines amounts to \$11,000,000. The cab-ahead locomotives, used for both freight and passenger service on the company's mountain divisions, will be constructed by the Baldwin Locomotive Works and the streamlined locomotives, for service on fast passenger and merchandise freight trains, by the Lima Locomotive Works. The comparative size of this single order for steam power in relation to purchases in recent years may be noted from the fact that in only three months since 1929 has a larger number of steam units been reported ordered by all railroad companies combined.

The company also placed orders for 25 Diesel-electric switching locomotives of 1,000 hp. which are in addition to the 15 Diesel-electric units of 600 and 660 hp. reported in the *Railway Age* of February 8. Cost of the total 40 Diesel-electric units is estimated at \$2,900,000. The orders for the 25 Diesel-electric locomotives were divided as follows: 10 to the American Locomotive Company, 10 to the Electro-Motive Corporation and 5 to the Baldwin Locomotive Works. Approximately 2,500 freight cars of various sizes and descriptions and costing \$9,000,000 are also provided for in the current program. Some of these will be constructed in the Company's own shops and the remainder by outside builders.

The company stated that these new equipment additions were being made for the primary purpose of keeping pace with the current increase in transportation requirements due to National Defense and of anticipating the increase yet to come as the defense program develops.

FREIGHT CARS

THE CANADIAN PACIFIC is inquiring for 250 33-ft., steel twin hopper cars of 50 tons' capacity

THE TENNESSEE COAL, IRON & RAILROAD Co. has ordered 90 ore cars of 70 tons' capacity and 85 hopper cars of 70 tons' capacity from the Pullman-Standard Car Manufacturing Company. Inquiry for

the 90 ore cars was reported in the *Railway Age* of January 11.

THE DELAWARE & HUDSON is reported to be contemplating the acquisition of from 500 to 900 hopper and gondola cars.

THE LEHIGH & NEW ENGLAND has placed an order for 100 bulk cement hatchway roof hopper-bottom cars of 70 tons' capacity with the American Car & Foundry Co.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 700 box cars of 50 tons' capacity from the American Car & Foundry Co. Inquiry for this equipment was reported in the *Railway Age* of February 22.

LOCOMOTIVES

Milwaukee to Buy 16 Diesels

The Chicago, Milwaukee, St. Paul & Pacific will petition the district court on March 19 for permission to purchase 16 Diesel-electric locomotives and to spend \$7,306,290 for improvements and equipment purchases outlined in the *Railway Age* of March 1. The Diesel-electric locomotives include the following:

2 1,000 hp.	} for switching and light road service
1 600 hp.	
10 360 hp.	
2 4,000 hp.	—for use on the "Hiawatha"
1 5,400 hp.	—for main line freight service

THE BOSTON & MAINE has ordered three 44-ton Diesel-electric locomotives of 380 hp. from the General Electric Company.

THE ST. PAUL UNION DEPOT has ordered one 44-ton Diesel-electric locomotive of 380 hp. from the General Electric Company.

THE PIEDMONT & NORTHERN has ordered one 128-ton, 1,500-volt d. c. electric locomotive from the General Electric Company.

UNITED STATES WAR DEPARTMENT orders placed with the General Electric Company so far this year include four 45-ton Diesel-electric locomotives of 300 hp. and three 60-ton Diesel-electric locomotives of 400 hp.

THE UNITED STATES NAVY DEPARTMENT has received delivery of the first of six 50-ton Diesel-electric locomotives of 300 hp. now on order with the General Electric Company. The ordering of this equipment has not been previously reported by the *Railway Age*.

IRON AND STEEL

THE WESTERN MARYLAND has placed orders for 2,000 tons of rail allocating 1,000 tons to the Carnegie-Illinois Steel Corporation and 1,000 tons to the Bethlehem Steel Company.

SIGNALING

THE CANADIAN NATIONAL is about to install centralized traffic control on the company's Atlantic region between Moncton and Pacific Junction to the west, a distance of 10.82 miles, and between Moncton and Truro to the east, a distance of 124.72 miles. This is reported to be the first installation of centralized traffic control in Canada.

Construction

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—In connection with the construction of a naval ammunition depot near Burns City, Ind., the Milwaukee has graded and built a driveway along an existing track to make a 23-car capacity team track and will construct a passing track 3,400 ft. in length and two interchange tracks, each with a capacity of 15 cars. The total cost of the work being done by the railroad will be approximately \$70,000.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—A contract has been awarded the Ross & White Company, Chicago, for an N. & W. type cinder plant to be installed at Van Wert, Ohio.

DELAWARE, LACKAWANNA & WESTERN.—This company has awarded a contract for construction of a new passenger station at Syracuse, N. Y., to the Irish Construction Company of that city.

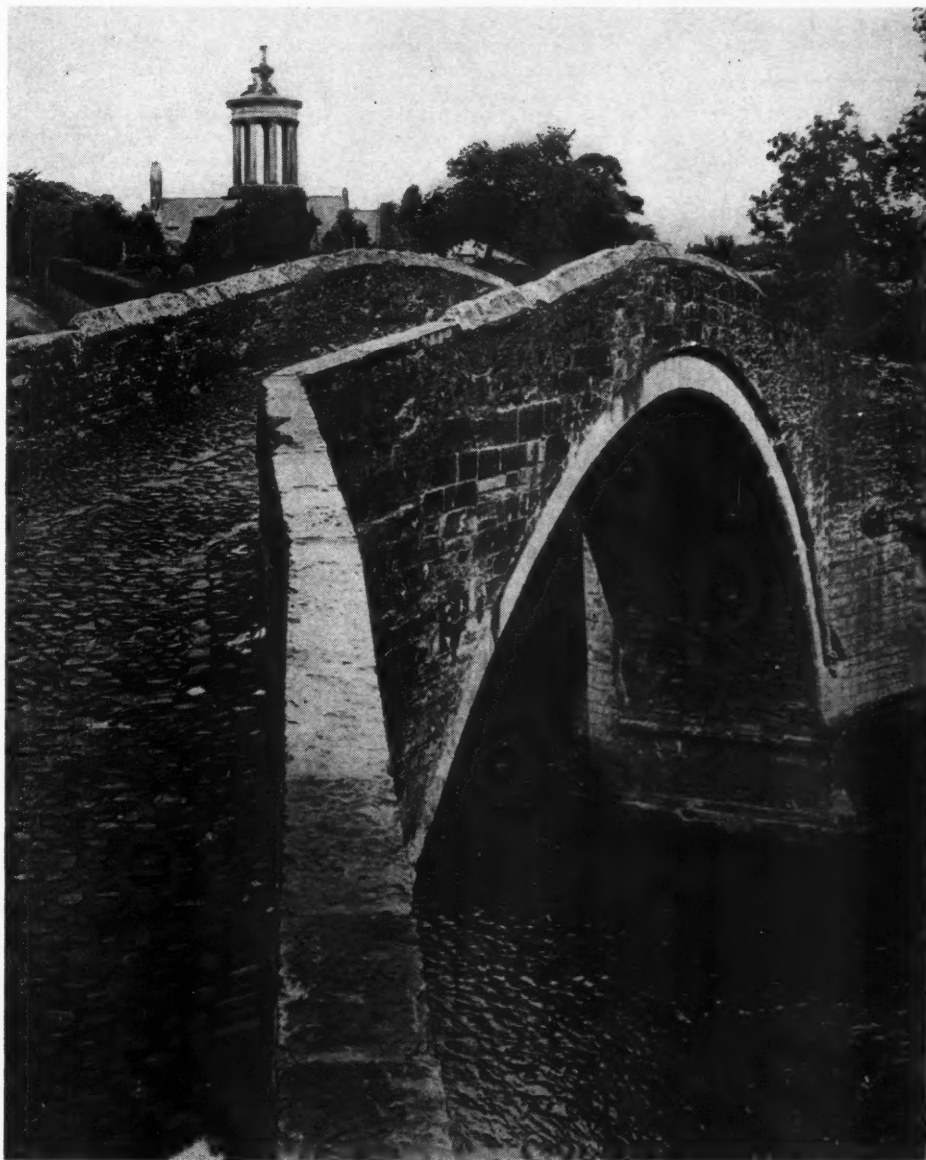
ILLINOIS CENTRAL.—A contract has been awarded to the Bates & Rogers Construction Corporation, Staten Island, N. Y., for construction work in connection with a tunnel lining in Indiana at estimated cost of \$75,000.

ILLINOIS TERMINAL.—A contract has been awarded to Bumiller & Meyersieck, St. Louis, Mo., for the construction of a warehouse at the southwest corner of 11th and Washington Streets in St. Louis, which will be used by the Flynn Forwarding Company. The building will be one story high, 40 ft. wide by 208 ft. long, with a 10-ft. platform along the track side. It will be constructed of reinforced concrete, brick and steel and will have eight loading doors 8 ft. square and two loading doors 10 ft. square on the truck side, and two loading doors 8 ft. square and two 10 ft. square on the track side. One end of the building will contain an office approximately 38 ft. square. The cost of the building, complete with driveways, equipment and platform scales, will be about \$21,000.

PENNSYLVANIA.—The Pittsburgh, Cincinnati, Chicago & St. Louis and the Pennsylvania, respectively, have been authorized to construct and operate a new line extending from Jeffersonville, Ind., to Charlestown, four miles. The new line will serve a powder plant now under construction as a part of the national defense program.

SOUTHERN PACIFIC.—The United States Engineer Office, Los Angeles, Cal., has awarded a contract amounting to \$52,062 to Clifford C. Bong, Temple City, Cal., for the rail relay and other work incident to the relocation of approximately 15,350 lin. ft. of main track and 800 lin. ft. of side track in Los Angeles, Cal., in connection with the Sepulveda dam project. The work consists of preparing the subgrade, laying the track, switches and side tracks, placing the decks on two bridges, placing the ballast and surfacing the track, and the installation of telegraph poles and right of way fences.

Continued on next left-hand page



BRIDGE O' DOON

SCOTLAND

This bridge is famous in Scotch legend and folk lore as the bridge toward which Tam O'Shanter was fleeing on his horse Maggie to escape witches and ghosts. In fact, the chase got so hot that one of the witches pulled off Tam's horse's tail and left scarcely a stump. It is a well-known fact that witches or any evil spirits have no power to follow a mortal any further than the middle of the next

running stream and that is why this bridge was Tam's goal when the pursuit started.

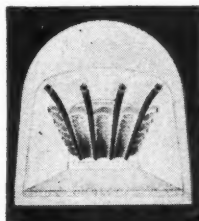
* * * * *

The Security Sectional Arch for the locomotive firebox was designed and developed to further the economy and effectiveness of the steam locomotive. But only when your locomotive is equipped with a complete arch can you realize true arch efficiency.

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Financial

ATCHISON, TOPEKA & SANTA FE.—*Abandonment by the Oil Fields & Santa Fe.*—The Oil Fields & Santa Fe and the Atchison, Topeka & Santa Fe, respectively, have asked the Interstate Commerce Commission for authority to abandon a line and the operation of the line known as the "Oilton District" and extending from Frey, Okla., to Oilton, 4.2 miles.

ATCHISON, TOPEKA & SANTA FE.—*Abandonment by the Gulf & Interstate of Texas.*—The Gulf & Interstate of Texas and the Gulf, Colorado & Santa Fe, respectively, have asked the Interstate Commerce Commission for authority to abandon the "Port Bolivar District," and the operation thereof, consisting of the following lines:

1. Ferry service from Galveston, Tex., to Port Bolivar, 3.9 miles; and
2. A line from Port Bolivar, Tex., to High Island, 26.7 miles.

BALTIMORE & OHIO.—*Abandonment.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to abandon that portion of its so-called Coal and Coke branch extending from Midvale, W. Va., to Adrian Junction, 12 miles.

BURLINGTON-ROCK ISLAND.—*Abandonment and Operation.*—This company has asked the Interstate Commerce Commission for authority to abandon operation between Houston, Tex., and Galveston, over lines of the Texas & New Orleans, the Galveston, Harrisburg & San Antonio, and the Southern Pacific Terminal, and to acquire trackage rights over a line of the Gulf, Colorado & Santa Fe between the same points, 51 miles.

CENTRAL OF GEORGIA.—*Abandonment.*—Acting on this company's request, Division 4 of the Interstate Commerce Commission has dismissed its application for authority to abandon a line extending from Statesboro, Ga., to Metter.

CHICAGO & NORTH WESTERN.—*Equipment Trust Certificates of the Chicago, St. Paul, Minneapolis & Omaha.*—The Chicago, St. Paul, Minneapolis & Omaha has asked the Interstate Commerce Commission for authority to assume liability for \$1,680,000 of equipment trust certificates, maturing in 15 equal annual installments of \$112,000 on April 15 in each of the years from 1942 to 1956, inclusive. The proceeds will be used as part payment for new equipment costing a total of \$2,100,000 and consisting of 700 40 ft., 6 inch box cars.

DELAWARE & HUDSON.—*Bonds of the Rensselaer & Saratoga.*—The Rensselaer & Saratoga has asked the Interstate Commerce Commission for authority to issue \$2,000,000 of first mortgage four per cent bonds, maturing on April 1, 1961. The proceeds will be used to pay off at maturity on May 1, a present issue of \$2,000,000 of first mortgage, six per cent, 20-year, gold bonds. The bonds, on which the Del-

aware & Hudson has asked the commission for authority to guarantee the interest and principal, will be sold to the Equitable Life Assurance Society of the United States at 100 per cent of par. Expenses of preparing the bonds and the mortgage will be borne by the D. & H.

DETROIT & MACKINAC.—*Annual Report.*—The 1940 annual report of this road shows net income of \$19,626, after interest and other charges, an increase of \$3,546 as compared with net income in 1939. Selected items from the income account follow:

	1940	Increase or Decrease Compared with 1939
RAILWAY OPERATING REVENUES	\$849,680	-\$27,128
Maintenance of way	139,608	+10,341
Maintenance of equipment	141,278	-27,482
Transportation	298,028	-1,661
—Rail		
TOTAL OPERATING EXPENSES	623,629	-20,034
NET REVENUE FROM OPERATIONS	226,051	-7,093
Railway tax accruals	41,753	-1,954
Railway operating income	184,297	-5,139
Equipment rents—Dr.	51,379	+5,333
Joint facility rents—Dr.	2,279	-430
TOTAL INCOME	135,897	+569
Interest on funded debt	113,221	-1,058
NET INCOME	\$19,626	+\$3,546

DETROIT, TOLEDO & IRONTON.—*Equipment Trust Certificates.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for \$1,150,000 of 1¼ per cent equipment trust certificates, maturing in 10 equal annual installments of \$115,000 on March 1 in each of the years from 1942 to 1951, inclusive. The issue has been sold at 98.323 to Evans, Stillman & Co., making the average annual cost to the company approximately 1.57 per cent.

GREAT NORTHERN.—This company has been authorized by Division 4 of the Interstate Commerce Commission to construct and operate a new line extending from a connection with its main line at Galena, Wash., easterly to Sunset Airport, near Spokane, eight miles.

JERSEYVILLE & EASTERN.—*Acquisition, Operation, and Stock.*—This new company has been authorized by Division 4 of the Interstate Commerce Commission to acquire and operate that part of the line of railroad formerly owned by the Chicago, Springfield & St. Louis, extending from the east right-of-way line of the Alton to the east line of State Street, in Jerseyville, Ill., 0.5 mile of main line and 1.1 miles of side track. At the same time the company was authorized to issue \$6,500 of common stock, consisting of 65 shares of a par value of \$100 each, to be sold at par and the proceeds used in connection with the abovementioned acquisition and operation.

KLAMATH NORTHERN.—*Acquisition.*—Division 4 of the Interstate Commerce Commission has reopened Finance Docket

No. 12999, Klamath Northern Acquisition, and set the matter for a further hearing at a time and place hereafter to be designated.

LEHIGH & NEW ENGLAND.—*Annual Report.*—The 1940 annual report of this road shows net income of \$844,043, a decrease of \$17,684 as compared with net income in 1939. Selected items from the income statement follow:

	1940	Increase or Decrease Compared with 1939
RAILWAY OPERATING REVENUES	\$4,427,029	+\$140,377
Maintenance of way	371,237	-84,920
Maintenance of equipment	762,387	+44,904
Transportation	1,377,657	+49,605
TOTAL OPERATING EXPENSES	2,779,450	+13,432
Operating ratio	62.78	-1.74
NET REVENUE FROM OPERATIONS	1,647,578	+126,944
Railway tax accruals	500,009	+148,470
Railway operating income	1,147,569	-21,526
Net Rents—Credit	151,760	6,323
NET RAILWAY OPERATING INCOME	1,197,280	-38,044
Non-operating income	22,393	-252
TOTAL INCOME	1,219,674	-38,296
Interest on funded debt	344,777	-21,451
TOTAL FIXED CHARGES	364,132	-6,791
NET INCOME	\$844,043	-\$17,684

NEW YORK, ONTARIO & WESTERN.—*Annual Report.*—The 1940 annual report of this road shows net deficit, after interest and other charges, of \$2,065,745, an increase of \$182,962 over the 1939 deficit. Selected items from the income account follow:

	1940	Increase or Decrease Compared with 1939
RAILWAY OPERATING REVENUES	\$5,466,414	-547,743
Maintenance of way	674,030	-4,978
Maintenance of equipment	1,281,598	+1,329
Transportation—Rail	2,909,904	-185,780
TOTAL OPERATING EXPENSES	5,296,846	-222,678
Operating ratio	96.90	+5.12
NET REVENUE FROM OPERATIONS	169,567	-325,064
Railway tax accruals	505,720	-36,874
Railway operating income*	336,153	+288,190
Equipment rents* (net)	318,443	-54,808
Joint facility rents* (net)	62,181	-13,279
NET RAILWAY OPERATING INCOME*	716,777	+220,102
Non-operating income	18,953	-13,653
GROSS INCOME*	697,823	233,755
Rent for leased roads and equipment	69,225	-42,064
Interest on funded debt	1,234,215	+9,085
TOTAL FIXED CHARGES	1,366,433	-49,581
NET INCOME (Deficit)	\$2,065,745	+\$182,962

* Deficit.

LOUISIANA & ARKANSAS.—*Operation.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to continue its operation under

Continued on next left-hand page

Reclaiming WASTE HEAT



The business depression has forced many to resort to various means of "reclamation" . . . some of which have paid satisfactory dividends.

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Waste heat reclamation, by effecting fuel saving and increased sustained boiler capacity, returns approximately $33\frac{1}{3}$ per cent on the cost of the equipment . . . admittedly big dividends on the capital invested.

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trackage rights over a line of the Texas & Pacific between Lobdell, La., and Torras, 48 miles.

NORFOLK SOUTHERN.—Reorganization.—Judge L. B. Way of the federal district court at Norfolk, Va., on March 10 signed the final decree of foreclosure and sale of the property of this road and set April 30 as date of sale. The decree fixed an upset price of \$2,000,000 if bought as a whole. C. M. Shanks, reorganization manager for the reorganized company to be known as N. S. Railway, will purchase the properties in accordance with the plan and agreement of reorganization already approved by the court (reviewed in the *Railway Age* of May 4, 1940, page 800).

PENNSYLVANIA.—Purchase by the Cleveland & Pittsburgh.—The Cleveland & Pittsburgh and the Pennsylvania, respectively, have asked the Interstate Commerce Commission for authority to purchase and operate a portion of the Beaver Valley extending from Vanport Junction, Pa., to College Avenue, 2.3 miles.

SOUTHERN PACIFIC.—Annual Report.—The preliminary annual report of the Southern Pacific Transportation System shows net income after interest and other charges, of \$9,315,610, an increase of \$3,181,036 over the 1939 income figure. Selected items from the income statement follow:

	1940	Increase or Decrease Compared with 1939
RAILWAY OPERATING REVENUES	\$231,932,279	+\$14,359,390
Maintenance of way	24,508,748	+2,356,931
Maintenance of equipment	38,936,085	+1,641,643
Transportation	87,125,990	+6,136,274
TOTAL OPERATING EXPENSES	169,268,711	+9,827,088
NET REVENUE FROM OPERATIONS	62,663,567	+4,532,301
Railway tax accruals	17,858,044	-234,516
Equipment and joint facility rents—net	12,339,664	+729,369
NET RAILWAY OPERATING INCOME	32,465,858	+4,037,448
Non-operating income	8,073,087	-1,187,578
TOTAL INCOME	40,538,946	+2,849,870
Rent for leased roads and equipment	34,185	+3,120
Interest on funded debt	29,108,263	-103,309
TOTAL FIXED CHARGES	29,862,691	-144,599
NET INCOME	\$9,315,610	+3,181,036

Average Prices of Stocks and Bonds

	Mar. 11	Last week	Last year
Average price of 20 representative railway stocks..	29.16	29.01	31.53
Average price of 20 representative railway bonds..	63.38	62.15	59.19

Dividends Declared

Dayton & Michigan.—87½¢, semi-annually; 8 Per Cent Preferred, \$1.00, quarterly, both payable April 1 to holders of record March 15.

Great Northern.—Preferred, 50¢, payable April 1 to holders of record March 14.

Lackawanna R. R. of New Jersey.—\$1.00, quarterly, payable April 1 to holders of record March 14.

New York, Lackawanna & Western.—\$1.25, quarterly, payable April 1 to holders of record March 14.

Philadelphia, Germantown & Morristown.—\$1.50, payable March 4 to holders of record February 20.

Railway Officers

EXECUTIVE

George F. Collins, Jr., has been elected president of the Sapulpa Union Railway, with headquarters at Sapulpa, Okla., succeeding **E. R. Willson**.

The headquarters of **C. S. McCain**, chairman of the executive committee of the Louisiana & Arkansas, have been transferred from Chicago to New York.

A. S. Gill, treasurer of the Midland Terminal, has been elected vice-president, treasurer and auditor, with headquarters as before at Colorado Springs, Colo.

The headquarters of **A. Trieschmann**, vice-president and general manager of the Ashley, Drew & Northern, have been transferred from Crossett, Ark., to Chicago, and **J. W. Watzek, Jr.**, secretary, has been elected vice-president and secretary, with headquarters as before at Chicago.

Champ Carry, vice-president, operating department, of the Pullman Company, with headquarters at Chicago, has been elected executive vice-president, a change of title. Mr. Carry will continue in charge of the operating department. **E. S. Taylor**, assistant to the vice-president, operating department, has been appointed director of the employees' suggestion system, a newly created position.

Charles A. Pinkerton, vice-president and general manager of the Detroit & Mackinac, has been elected president and general manager, with headquarters as before at Tawas City, Mich., succeeding **Henry K. McHarg**, whose death on January 28, was announced in the *Railway Age* of February 1.

Mr. Pinkerton was born at Saginaw, Mich., on February 11, 1880, and entered railway service in 1897 as a clerk in the car service department of the Flint & Pere Marquette (now the Pere Marquette) at Saginaw. In 1899 he went with the Detroit & Mackinac as a clerk in the office of the general superintendent at East Tawas City, Mich., later being appointed car accountant. Mr. Pinkerton was promoted to superintendent of car service in 1906 and in 1909 he was advanced to superintendent of transportation. In 1927 he was promoted to general superintendent and on May 1, 1933, to vice-president and general manager.

Anton Anderson, whose promotion to assistant chief operating officer of the Chicago, Indianapolis & Louisville (Monon), in addition to his duties as chief engineer, with headquarters at Lafayette, Ind., was announced in the *Railway Age* of March 1, was born at Lafayette, on October 12, 1879, and graduated in civil engineering from Purdue University in 1901. After working a year for the American Bridge Company, at St. Louis, Mo., Mr. Anderson entered railway service in 1902 as a draftsman for the Choctaw, Oklahoma & Gulf (now part of the Chicago, Rock Island & Pacific). In

the following year he became office engineer and masonry engineer for the Indianapolis Northern Traction Company, and in January, 1903, he became engaged



Anton Anderson

on location work for the Midland Valley. In August, 1904, he was appointed city engineer at Lafayette, later resigning this position to become resident engineer at the same place for the Chicago, Indianapolis & Louisville. On this road he advanced successively through the positions of engineer of construction, assistant engineer, division engineer, valuation engineer, and principal assistant engineer, with headquarters at Chicago. In August, 1918, he was made corporate engineer and in March, 1920, he was promoted to engineer of maintenance of way, with headquarters at Lafayette. Mr. Anderson was promoted to chief engineer, with the same headquarters, on February 1, 1938, which position he held until his recent promotion, effective February 22.

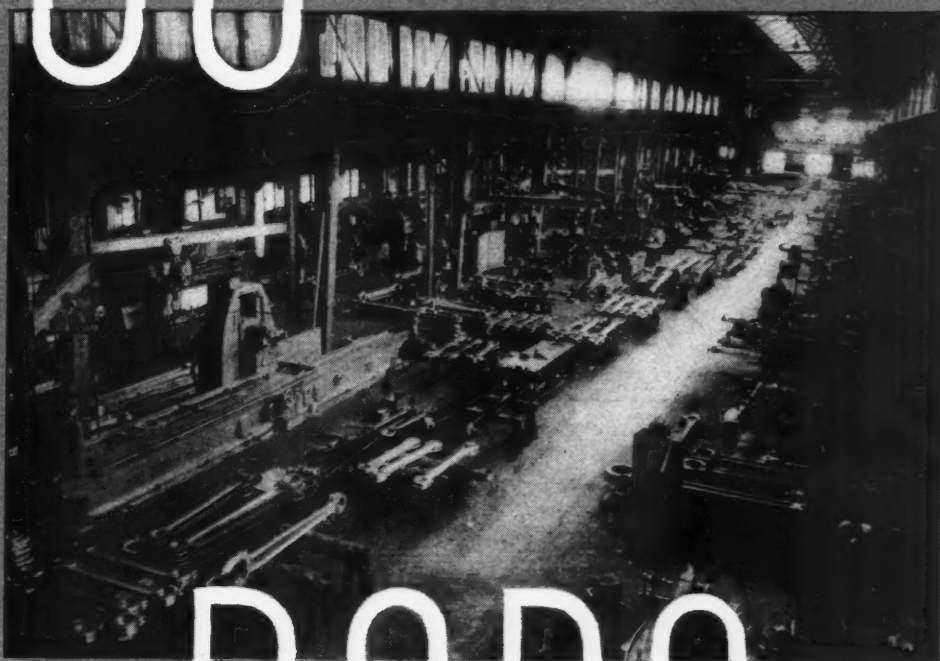
William Way, Jr., whose appointment as executive assistant in charge of educational activities of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., was announced in the *Railway Age* of March 1, was born at Charleston, S. C., on June 2, 1906, and received the degrees of bachelor of arts and master of arts from the University



William Way, Jr.

of North Carolina. He entered railroad service as a flagman on the Atlantic Coast Line in 1925, and in 1929 was appointed pass clerk in the general superintendent's office at Savannah, Ga. Later he served as

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secretary to the general superintendent and in 1931 became car distributor in Savannah. He was promoted in 1933 to assistant in the superintendent of transportation's office at Jacksonville, Fla., in charge of passenger trains. He was promoted to yardmaster at Dothan, Ala., in 1936, and resigned July 31, 1937. From that date until his appointment by the N. C. & St. L. on February 15, 1941, he served on the faculty of the Commerce & Transportation department, Wharton School of Finance & Commerce, University of Pennsylvania, Philadelphia, Pa.

FINANCIAL, LEGAL AND ACCOUNTING

M. G. Roberts, general attorney and commerce counsel of the St. Louis-San Francisco, has been promoted to general counsel, with headquarters as before at St. Louis, Mo., succeeding **Joseph W. Jamison**, whose death on July 15, 1940 was announced in the *Railway Age* of July 20, 1940.

TRAFFIC

W. C. Meyer has been appointed traffic manager of the Midland Terminal, with headquarters at Colorado Springs, Colo.

A. J. Kitz, district passenger agent of the Seaboard Air Line, has been promoted to assistant general passenger agent, with headquarters as before at New York.

H. G. Feth, assistant general freight agent on the Chicago & Eastern Illinois, has been appointed industrial agent, with headquarters as before at Chicago.

Charles E. Barry has been appointed manager of the foreign freight department of the Chicago, Rock Island & Pacific, a newly created position, with headquarters at Chicago.

C. H. Johnson, assistant general passenger agent on the Norfolk & Western at Cincinnati, Ohio, has been promoted to general passenger agent, a change of title, with the same headquarters.

Kenneth C. Miller, agricultural and live stock agent of the Spokane, Portland & Seattle, has been appointed also industrial agent, with headquarters as before at Portland, Ore.

J. L. Power, general agent on the Illinois Terminal at St. Louis, Mo., has been promoted to assistant general freight and passenger agent, with the same headquarters, and the position of general agent at St. Louis has been abolished.

Raymond W. Carroll has been appointed acting general passenger agent of the Rutland, succeeding **W. H. Clifford** who has resigned to accept service with the New England Passenger Association in Boston, Mass.

A. M. Brinker has been appointed assistant general freight agent of the Baltimore & Ohio, with headquarters at Washington, D. C., to succeed **John H. Hague**, who has been promoted to general freight agent, with the same headquarters. **John**

J. Collins has been appointed district freight agent at Washington.

Walter G. Young, division passenger agent for the Chicago, Rock Island & Pacific at Chicago, has been promoted to manager of the vacation travel service bureau, with the same headquarters, succeeding **Daniel M. Wootton**, whose death on February 20 was announced in the *Railway Age* of March 1.

D. C. Kelsey, general agent on the Erie at St. Louis, Mo., has been transferred to Los Angeles, Cal., succeeding **J. A. Russell**, who has been promoted to manager of perishable and dairy freight traffic at New York. It was incorrectly announced in the *Railway Age* of March 8 that D. C. Kelsey had been appointed manager of perishable and dairy freight traffic at New York.

Carl W. Evers, general freight agent on the Union Pacific, with headquarters at Omaha, Neb., has been promoted to assistant traffic manager, with headquarters at Portland, Ore., a newly created position, and **Marshall R. Bryan**, general agent at Milwaukee, Wis., has been advanced to general freight agent, with headquarters at Omaha, Neb., succeeding Mr. Evers. **James MacAnally, Jr.**, chief clerk in the freight traffic department at Chicago, has been promoted to general agent at Milwaukee, relieving Mr. Bryan.

Mr. Evers was born at Council Bluffs, Iowa on March 4, 1896, and entered railway service in July, 1914, as a clerk-stenographer in the operating department of the Union Pacific at Council Bluffs. In September, 1916, he went with the Grand Trunk as chief clerk to the commercial agent at Omaha, but returned to the Union Pacific as secretary to the superintendent of transportation in April, 1917. During the war he served with the U. S. Army, but returned in August, 1919, as secretary to the assistant general freight agent at Omaha. In March, 1920, he was promoted



Carl W. Evers

to secretary to the passenger traffic manager, and in November, 1922, he was appointed secretary to the assistant to the vice-president. In October, 1923, he was promoted to assistant chief clerk in the traffic department, and on February 1, 1927, he was appointed traveling freight agent at Sioux City, Iowa. On Decem-

ber 31, 1927, he was advanced to general agent at that point, and on November 15, 1935, he was transferred to Omaha, where he served as general agent in the freight department. Mr. Evers was promoted to assistant general freight agent on August 20, 1938, and five days later he was advanced to general freight agent.

Robert E. O'Grady, whose promotion to coal traffic manager of the Erie, with headquarters at Cleveland, Ohio, was announced in the *Railway Age* of March 8, was born in Brooklyn, N. Y., on February 24, 1896, and attended Kissick Business



Robert E. O'Grady

College. He entered railway service in June, 1913, as secretary to the freight traffic manager of the Southern Pacific at New York, and in August, 1916, became secretary to the traffic manager of the American Sugar Refining Company at New York. During the first World War he served in the U. S. Army as a second lieutenant, returning to the traffic department of the American Sugar Refining Company in September, 1919. In March, 1921, he went with the Erie as commercial agent at New York, and five years later he was promoted to perishable freight agent. In March, 1932, he was appointed manager of perishable freight traffic and in June, 1939, he was appointed manager of perishable and dairy freight traffic, which position he held until his recent promotion.

OPERATING

R. R. Boucher, acting superintendent of the Rio Grande Southern, has been appointed superintendent, with headquarters as before at Durango, Colo.

W. H. McKay, master mechanic of the Midland Terminal, has been appointed general manager, with headquarters as before at Colorado Springs, Colo.

Edgar A. Thompson, yardmaster on the Western Pacific at San Francisco, Cal., has been promoted to terminal trainmaster, with headquarters at Oakland, Cal., succeeding **John P. McSweeney**, deceased.

Henry C. Whittaker has been appointed night trainmaster of the Kansas City division of the Atchison, Topeka & Santa Fe at Argentine, Kan., succeeding



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PENNSYLVANIA

V. E. Lovett, who has been assigned to other duties.

E. A. Teed has resumed his duties as superintendent of terminals on the St. Louis-San Francisco at Birmingham, Ala., and **D. B. Cronin**, acting superintendent of terminals at that point, has resumed his duties as general yard inspector.

G. C. White, trainmaster on the Erie at Port Jervis, N. Y., has been transferred to Marion, Ohio, succeeding **O. V. J. McMullen**, whose promotion to assistant superintendent at Chicago was announced in the *Railway Age* of February 22. **C. S. Kinback**, trainmaster at Susquehanna, Pa., has been transferred to Port Jervis, replacing Mr. White, and **D. A. Logan**, trainmaster at Hornell, N. Y., has been transferred to Susquehanna, relieving Mr. Kinback. **J. P. Allison** has been appointed trainmaster at Hornell, succeeding Mr. Logan.

ENGINEERING AND SIGNALING

T. W. Hayes has been appointed assistant signal engineer of the South-Central and Northwestern districts of the Union Pacific, with headquarters at Salt Lake City, Utah, succeeding **D. C. Bettison**, who has been transferred to Omaha, Neb.

Thomas L. Phillips, whose promotion to chief engineer, of the Western Pacific, with headquarters at San Francisco, Cal., was announced in the *Railway Age* of February 15, was born in Alsea, Oregon, on December 28, 1881, and completed a correspondence course in civil engineering. In 1902 he served as an axman, rodman and instrumentman, for the Pokegama Sugar Pine Lumber Co., in Siskiyou county, Cal., and later in that year entered railway service, serving for several years on railroad location and construction for a number of railways in Northern California, including the Atchison, Topeka and Santa Fe, the McCloud River Railroad, and the Albion Lumber Company Railroad. He then became resident engineer on dam and tunnel location and construction for the Eel River Power and Irrigation Co., in Mendocino



Thomas L. Phillips

county, Cal. On November 20, 1905, Mr. Phillips went with the Western Pacific as resident construction engineer at Niles, Cal., and from 1908 to 1909 he was assist-

ant engineer in charge of the construction of the Western Pacific lines, wharfs and other terminal facilities in San Francisco. After the completion of the construction of the Western Pacific, he continued to serve as assistant engineer on location and construction. From 1918 to 1920, during the period of Federal Control, he was division engineer of the Western division with headquarters at Sacramento, Cal. Between July, 1920 and July, 1921, he took a leave of absence to serve as chief engineer of the Hutchinson Lumber Company on the location and construction of a 25-mile railroad from Land, Cal., to Feather Falls. On the latter date he returned to the Western Pacific as assistant engineer and in June, 1927, he was promoted to principal assistant engineer.

George T. Tate, whose promotion to principal assistant engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., was announced in the *Railway Age* of March 8, was born at Columbus, Ga., and graduated in civil engineering from the Alabama Polytechnic In-



George T. Tate

stitute in 1910. He entered L. & N. service on September 9, 1910, as a rodman on construction and was later promoted to locating engineer and assistant resident engineer. During the first World War he served overseas with the 22nd Engineers of the U. S. Army, afterwards returning to the L. & N. On March 1, 1923, Mr. Tate was appointed office engineer for the chief engineer of construction, and on January 1, 1932, he was promoted to assistant engineer in the chief engineer's office, the position he held until his recent promotion.

Howard C. Forman, assistant division engineer on the Louisville & Nashville at Middlesboro, Ky., has been promoted to assistant engineer in the chief engineer's office at Louisville, Ky., succeeding **George T. Tate**, whose promotion to principal assistant engineer was announced in the *Railway Age* of March 8.

Charles H. Blackman, whose promotion to assistant chief engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., was announced in the *Railway Age* of March 8, was born at Nashville, Tenn., on September 6, 1881, and attended Vanderbilt University. He

entered railway service in 1900 as a rodman on the Tennessee Central and on May 13, 1901, he went with the L. & N. as a rodman on the Louisville division, later



Charles H. Blackman

being promoted to instrumentman, draftsman and assistant engineer of the Pensacola division. On March 1, 1906, he was transferred to the chief engineer's office, and a year later he was appointed resident engineer of construction at Birmingham. Mr. Blackman later returned to the chief engineer's office, as assistant engineer and on October 1, 1914, he was advanced to principal assistant engineer, which position he has held until his recent promotion. Mr. Blackman is a past-president of the Engineers and Architects Club of Louisville.

MECHANICAL

A. R. Snyder, acting master mechanic for the Union Pacific at Council Bluffs, Iowa, has been promoted to master mechanic at that point.

W. B. Weightman, assistant road foreman of engines of the Philadelphia division of the Pennsylvania, has been promoted to general air brake inspector of the Central region, to succeed the late **William Buckley**.

OBITUARY

C. O. Long, division engineer on the Pennsylvania at Ft. Wayne, Ind., was killed in an automobile accident at Waco, Tex., on March 11. Mr. Long was on a vacation trip with his wife who was also killed in the accident.

James J. O'Neal, superintendent of the car department of the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala., died on February 26, after a short illness. Mr. O'Neal was born at Arcadia, Mo., on March 3, 1869, and entered railway service on March 1, 1890, with the St. Louis, Iron Mountain & Southern (now part of the Missouri Pacific). In 1900 he went with the St. Louis, Memphis & South Eastern (now the St. Louis-San Francisco) and on January 1, 1905, he went with the Mobile, Jackson & Kansas City (now part of the Gulf, Mobile & Ohio) as a general car foreman, later being advanced to superintendent of the car department.